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'BUFF' won't be going back on alert – yet



Lightning strikes behind a B-52H Stratofortress at Minot Air Force Base, North Dakota, in August. For now at least, there are no plans to have nuclear-armed bombers standing on alert at the end of the runway. USAF/Senior Airman J T Armstrong

Air Force Global Strike Command's fleet of B-52H strategic bombers is not going back onto 24hr alert status after all. The US Air Force was quick to quash rumours that plans were being prepared for the Stratofortress to return to a Cold War-style routine of nuclear-armed aircraft sitting ready on concrete pads while crews pulled round-the-clock shifts in a dedicated facility, waiting for the klaxon to sound.

The original story emerged after Gen David Goldfein, the USAF Chief of Staff, made a six-day tour of Barksdale Air Force Base and other nuclear facilities. Part of the reason for his visit to the Louisiana base was to inspect infrastructure upgrades – including crew rest areas – but the revamp is intended to help ease operations if the 'BUFF' ever goes back on alert, not to facilitate them in the near future.

Readiness to respond is one thing, but there are plenty of reasons why putting these ageing bombers back on a hair trigger is not such a good idea. While dispersals full of bombers were a logical response to a possible Soviet first strike back in the 1960s, today's security environment is very different. Simply put, submarine-based missiles are more

survivable than bombers, and a portion of the fleet is always on alert. Such a measure would be tough on a veteran fleet of bombers and equally hard on the crews – and this at a time when the USAF is facing a major pilot shortage. It would be risky, too. When a B-52 flew from Minot to Barksdale in 2007 mistakenly loaded with six nuclear-tipped cruise missiles, it led to the resignations of the Secretary of the Air Force and Chief of Staff of the Air Force. Such a move also threatens to further undermine stability at a time of poor relations with Russia. Furthermore, it would increase the number of deployed warheads, meaning cuts would have to be made elsewhere in the 'nuclear triad'.

Perhaps most importantly, it would tie up bombers that are still in demand for the conventional mission – and for deployments to the Middle East, Guam and Europe. These continuous rotations provide rapid global strike capability and send a clearer message than bombers waiting on alert 'back home'.

Regular readers may have noticed some subtle design changes within the pages of *AFM* in the last few months. As of the January issue, we will be introducing a distinctive new look to the cover as well. We hope you like it.



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News by Region

All the world's military aviation news.

- 6-7 Headlines
- 8-9 United Kingdom
- 10-13 Continental Europe
- 14-17 North America
- 20-21 Latin America
- 22 Africa
- 24-25 Middle East
- 26 Russia & CIS
- 28-29 Asia Pacific
- 30 Australasia

Above: A Luftwaffe Eurofighter EF2000 from Taktisches Luftwaffengeschwader 73 'Steinhoff' approaches the Transall photo-ship during a Weapons Instructor Course mission over the Baltic Sea. *Stefan Petersen*

Regular features

32 INTEL REPORT: Iraqi L-159s in combat

This November marks the second anniversary of the Aero Vodochody L-159 Advanced Light Combat Aircraft's (ALCA's) arrival in Iraq. Since then, the Czech-built fighter has proven its qualities to the Iraqi Air Force (IQAF) during a time of great need, as Alan Warnes discovers.

44 EXERCISE REPORT: Falcon Leap 2017

Falcon Leap, an international paratrooper exercise organised by the Royal

Netherlands Army's 11 Air Mobile Brigade, has its roots in the commemoration of World War Two's Operation Market Garden. Manolito Jaarsma reports.

46 SURVEY: European MPAs Part 2

AFM's correspondents continue their round-up of the maritime patrol aircraft fleets of Europe's NATO and Partnership for Peace members. This month, the focus turns to Greece, Ireland and Italy.

52 EXERCISE REPORT: Grifone 2017

Personnel from armed forces and



Features

3 Comment

AFM's opinion on the hot topics in military aviation.

38 Future imperfect?

Tim Ripley looks at the implications for the country's air arms in the run-up to the latest UK defence review.

64 Raptors on the road

In October, F-22A Raptors from Joint Base Langley-Eustis stopped off at RAF Lakenheath for a Fighter Training Detachment en route home from combat operations in the Middle East. Jamie Hunter caught up with the 1st Fighter Wing team as they completed their spell in the UK.

70 Rafale in Chammal

Three years on from the launch of Opération Chammal, the French military campaign against so-called Islamic State, Jean-Marc Tanguy examines the Rafale mission and talks to the Chief of the Staff of the French Air Force André Lanata.

76 Belgian-French jet training connection

At the end of next year the last Belgian Air Component jet pilot students will complete their training with ETO 2/8 'Nice' at Cazaux in southwest France. Stefan Degraef appraises the bi-national Advanced Jet Training School.

86 Rotary reshuffle for RTP

The Royal Thai Police Aviation Division is undergoing modernisation, with several helicopter types being replaced, writes Dino van Doorn.

88 Fight to win

The Luftwaffe's Fighter Weapons School is becoming established at Laage air base in northeast Germany. Stefan Petersen discovered how the school provides demanding training for top Eurofighter pilots and support personnel.

96 Always and everywhere

Under current plans, time looks to be running out for the Royal Netherlands Air Force's unique Gulfstream IV, as Stephan de Bruijn reports.

government agencies attended the tenth Grifone exercise – held in Dobbiaco in the Dolomites from September 4-8 – in order to acquire new skills and share experiences of mountain search and rescue. Alberto Celsan and Marco Bazzan investigate.

54 FORCE REPORT: People's Liberation Army Air Force Part Two

AFM continues its analysis of the People's Liberation Army Air Force (PLAAF), with Andreas Rupprecht assessing its latest structure and providing an up-to-date order of battle for its frontline units.

82 COMMANDER'S UPDATE BRIEFING: War games or gamers?

Air Power Association President Air Marshal (Ret'd) Greg Bagwell CB CBE looks at the challenges of providing future frontline pilots with operational readiness training that meets the demands of fifth-generation fighters.

92 Attrition

Dave Allport details the world's most recent military accidents.

98 Coming up

See what's featuring in your AFM next month.

Cover: A US Air Force F-22A Raptor somewhere over the Middle East during a mission in support of Operation Inherent Resolve on August 29. Raptor squadrons have played an important role in OIR, tackling so-called Islamic State and in the process notching up their first weapons employment in combat operations. USAF/Staff Sgt Michael Battles

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USAF F-35s arrive in Japan



Above: A USAF F-35A from Hill AFB taxis for take-off at Joint Base Pearl Harbor-Hickam, Hawaii, on October 13. USAF/Tech Sgt Heather Redman

THE US Air Force announced plans for the F-35A's first official operational overseas deployment on October 23. Around 300 personnel and 12 Lightning IIs from Hill Air Force Base, Utah's 34th Fighter Squadron (FS) began to arrive at Kadena Air Base, Japan on October 30, when the first two jets touched down. They will remain there for a six-month rotation in the US Pacific Command's

(PACAF's) first operational tasking for the F-35A.

"The F-35A gives the joint warfighter unprecedented global precision attack capability against current and emerging threats while complementing our air superiority fleet," said Gen Terrence J O'Shaughnessy, PACAF commander.

The F-35A is being deployed under PACOM's Theater Security Package (TSP) programme, which began in 2004.

US Marine Corps F-35Bs have been based at Marine Corps Air Station Iwakuni, Japan since January. Meanwhile, USAF F-35As from Hill AFB's 34th and 466th Fighter Squadrons deployed to Europe in April.

Although officially a training mission, the jets took part in NATO reassurance sorties.

In related news, F-35A pilots continue to report hypoxia-like symptoms.

Five such physiological episodes have been reported after flying resumed following a fleet grounding at Luke this summer. As of mid-October, a total of ten such incidents had been reported for the year. As part of a continuing investigation the Joint Program Office has examined the aircraft's on-board oxygen generation system, but found no problems.

Two new Super Tucano orders

SIERRA NEVADA Corporation (SNC) and its partner Embraer Defense & Security have secured an order for six more A-29 light attack aircraft for delivery to Afghanistan. SNC announced the deal, placed via the US Air Force's A-29 Afghanistan Program, on October 25. Production of the six additional Super Tucanos was due to start immediately in Jacksonville, Florida, and will bring the Afghan Air Force fleet to 26 aircraft.

Meanwhile, Embraer announced the sale of six A-29 Super Tucanos to a different, undisclosed customer on October 16.

Deliveries under this order will be completed in 2018.

Scaled Composites unveils Model 401



The Model 401 displays a number of outward similarities with the General Atomics Predator C Avenger. Scaled Composites

SCALED COMPOSITES revealed the existence of a new experimental aircraft, the Model 401, when it announced the prototype's recent first flight in an October 11 report. The company has built two Model 401 prototypes for an undisclosed customer "to demonstrate advanced, low-cost manufacturing

techniques, and to provide aircraft for research flight services to industry partners and the United States government".

The single-seat aircraft is powered by a Pratt & Whitney JTD15D-5D engine and can reach Mach 0.6. It has an endurance of up to three hours. The Model 401 is 38ft (11.6m) long

and has a 38ft wingspan. It has an empty weight of 4,000lb (1,814kg) and a maximum take-off weight of 8,000lb (3,629kg).

The two prototypes received Federal Aviation Administration certification on April 19. Little more is known about the Model 401, its customer or its intended mission.

Northrop Grumman leaves MQ-25 programme

NORTHROP GRUMMAN has exited the US Navy's MQ-25 Stingray Unmanned Carrier Aviation Air System (UCAAS) programme. Northrop CEO Wes Bush announced the decision on October 25. Company spokesperson Tim Paynter said the acquisition approach outlined in the request for proposals (RFP) would require the company to make a bid that would not be in the best interests of itself and its shareholders. This suggests the firm believed it would be unable to fully develop an unmanned carrier-based refuelling tanker system that met specifications and still delivered profit for the company.

Northrop had been seen as the frontrunner in the bidding, thanks to its wealth of experience developing the X-47B stealthy unmanned aircraft system.

Boeing, Lockheed Martin and General Atomics are still in the running for the final Stingray design award, expected by the end of Fiscal Year 2018.

Gripen E goes supersonic



The Gripen E prototype, 39-8, has completed more than 20 flying hours since its first flight on June 15. Saab

THE SAAB Gripen E was flown at speeds in excess of Mach 1 for the first time on October 18. The aircraft broke the sound barrier over the Baltic Sea as part of the fighter's

flight trials programme. According to a statement from the company, the "aircraft sustained supersonic speed for a number of minutes, whilst carrying out manoeuvres,

demonstrating the successful combination of the aircraft's fighter design and its powerful engine."

Test pilot for the sortie, Marcus Wandt, said:

"As Gripen pilots we are used to extreme speed but to go through the sound barrier for an aircraft's first time is still a moment to enjoy.

"It is important that

the aircraft handles the transition smoothly through what we call the transonic zone around the sound barrier and she certainly did, it was very smooth."

RAAF KC-30A refuels B-52H



Above: KC-30A A39-005 refuelling 419th FLTS B-52H 60-0036 over California on September 11. USAF/Donald R Allen

A ROYAL Australian Air Force (RAAF) KC-30A has taken part in refuelling

trials with a US Air Force B-52H from the 419th Flight Test Squadron (FLTS)

at Edwards Air Force Base, California. The test sortie, announced on October 12,

involved No 33 Squadron KC-30A A39-005 tanking 419th FLTS B-52H 60-0036

in the skies over California the previous month.

Personnel from the RAAF Air Warfare Centre (AWC) Aircraft Research and Development Unit, 86 Wing and the 418th and 419th FLTS were involved in the mission, which was revealed by the USAF's 412th Test Wing Public Affairs department. The B-52 trial is part of the RAAF AWC's flight test programme, while ongoing testing with the KC-30A is a component of a Coalition Tanker Aerial Refuelling Certification effort. The first flight in the series on December 3, 2015 saw a KC-30 refuel an Edwards-based F-16. **Dave Allport**

French Air Force and contractors respond to Niger ambush

ASSETS FROM the Armée de l'Air (French Air Force) and US contractor Berry Aviation were involved

in the aftermath of the ambush of US soldiers in Niger on October 4. A patrol of US Army special

forces and the Nigerian armed forces was returning to its operating base when it came under

attack near the Niger-Mali border by around 50 fighters associated with so-called Islamic

State. Four US Army Green Berets were killed.

A US remotely piloted aircraft was on the scene "within minutes", but did not strike, according to the Pentagon. French fixed-wing aircraft and helicopters also responded, US Defense Secretary Jim Mattis said. Two French Mirage 2000s arrived around two hours after initial contact and performed a 'show of force'. Meanwhile, the French Super Pumas evacuated wounded soldiers. An unidentified US-contracted aircraft flew in to retrieve the bodies of the Green Berets killed in the fighting.



Above: French Mirage 2000C and 2000D jets at Niamey air base in Niger, from where the October 4 mission was flown. From October 18-24 the French fighters on Opération Barkhane flew a total of 46 sorties. Armée de l'Air

F-35B clear for carrier take-off



Above: The latest British F-35 to get airborne, F-35B BK-13 made its first flight from Fort Worth, Texas on October 10. Carl Richards

THE F-35B short take-off and vertical landing (STOVL) fighter has been cleared to use the 'ski-jump' fitted to the flight deck of the Royal Navy's two new aircraft carriers. The decision came after a series of tests at Naval Air Station Patuxent River, Maryland (see *External-load 'ski jump' trials for F-35B*, October, p8). Minister for Defence Procurement Harriett Baldwin announced the development at the House of Commons Defence Select Committee on October 17.

Baldwin said: "Successful ski-ramp trials mean the F-35 is cleared to fly from the carrier as the momentum continues

for this game-changing jet. This milestone comes as our pilots and planes prepare to return from the States, ready for next year's unforgettable flight trials from the deck of the nation's new flagship."

The Pentagon announced on the same day that Lockheed Martin has been awarded an \$11.56m delivery order to provide support for first-of-class flying trials and the release of the military permit to fly for F-35B aircraft to operate from the Queen Elizabeth-class carriers.

As of mid-October the UK had 12 F-35Bs in the US, building the UK Force ahead of trials aboard the carrier HMS *Queen*

Elizabeth (R08) next year. Two more Lightning IIs were due to be delivered by the end of the year, and the first of these, BK-13, made its maiden flight on October 10.

There are 150 UK personnel working on the Lightning II programme in the US, and the F-35 Integrated Test Force includes five British pilots. One of them, Sqn Ldr Andy Edgell, said: "[The F-35 is] marvellous. She has an incredible amount of thrust but it's more than just brawn that makes her so fantastic to fly – it's the brains behind her as well. She's a masterful piece of engineering and it makes her so effortless to fly."

The October 17 briefing also confirmed that the latest course of UK pilots has finished ground school and they are now ready to fly the F-35B at Marine Corps Air Station Beaufort, South Carolina. Among those to have graduated are four ab initio pilots who began F-35 training straight from the Hawk T2 at RAF Valley, Wales, and Wg Cdr John Butcher, who will be officer commanding No 617 Squadron, Royal Air Force.

October also saw a first UK F-35B flight with the latest Block 3F software take place at Edwards Air Force Base, California. This software upgrade represents the full

warfighting capability the UK F-35s will have when initial operating capability is declared, envisaged for December next year.

In related news, the UK F-35's risk rating for on schedule delivery has been increased due to delays in supplying representative simulators to the RAF. The UK Parliamentary Public Accounts Committee released details on October 9, stating that: "the Senior Responsible Owner (SRO) for the UK's Lightning II programme revised his programme delivery confidence, reflecting compression in the schedule, from amber to amber/red in June 2017."

Final sortie for No 41 (R) Squadron Tornado GR4s

TORNADO OPERATIONS at RAF Coningsby, Lincolnshire, ended on October 13, when the last two Tornado GR4s operated by No 41 (Reserve) Test and Evaluation Squadron carried out a final mission. The aircraft involved were ZA560 'EB-Q' callsign 'Viking 2' and ZA607 'EB-X' 'Viking 1'.

Following the final sorties on October 13, ZA607 was delivered straight to RAF Marham, Norfolk. ZA560 returned to Coningsby for static display during the week-long Air Combat Power Visit, which began on October 21 and continued

the following week. It finally left for Marham on October 30.

Tornados have flown from Coningsby on and off for the last 33 years, ever since the first two Tornado F2s for No 229 Operational Conversion Unit arrived on November 5, 1984.

No 41(R) Squadron will continue to fly here, but with an all-Typhoon fleet. The squadron had flown the Tornado GR4 since April 1, 2006, when it was officially re-formed by re-badging the Fast Jet and Weapons Operational Evaluation Unit. **Dave Allport**



Above: The final two Tornado GR4s operated by No 41(R) Test and Evaluation Squadron, ZA560 'EB-Q' and ZA607 'EB-X', flying over Lincolnshire during one of their last sorties. Crown Copyright/RAF Leeming SAC Parkinson

Brimstone milestone for Typhoon



A Typhoon trials aircraft demonstrates a 'Centurion load-out' of Brimstone and Paveway IV precision-guided munitions, Meteor beyond-visual-range air-to-air missiles and ASRAAM. Jamie Hunter

BAE SYSTEMS is continuing to make progress with the Project Centurion capability upgrade for the RAF's Typhoon fleet. Eurofighter says the test campaign for the MBDA Brimstone precision-guided munition was completed on September 25. A series of trials over the summer led to the weapon being declared safe for carriage on the Typhoon. A total of nine Brimstone jettisons and nine firings were completed between July 13 and September 25.

The Typhoon Force is due to field the Project Centurion configuration by the end of next year, enabling the aircraft to assume the responsibilities of the Tornado GR4, which is scheduled for retirement in 2019.

HMS Queen Elizabeth leaves Portsmouth for sea trials

THE ROYAL Navy aircraft carrier HMS *Queen Elizabeth* sailed from Portsmouth Naval Base for the first time on October 30. The warship was departing on the next phase of sea trials having arrived at her homeport in August.

Captain of Portsmouth Naval Base, Capt Bill Oliphant said: "HMS *Queen Elizabeth* has been in Portsmouth Naval Base for two months of planned



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maintenance to allow her to sail to complete her sea trials today. This period at sea will mark an extremely

significant milestone in the life of the ship leading towards her acceptance into the Royal Navy at her

commissioning later this year, back in her home port of Portsmouth." The carrier was expected to

be at sea for a month before being delivered to the Royal Navy at the end of the year.

No 6 Squadron returns from Magic Carpet

TYPHOONS FROM the RAF's No 6 Squadron based at RAF Lossiemouth, Scotland, have completed a two-week training deployment to Oman. Eight Typhoons took part in Exercise Magic Carpet 17, which involved joint exercises with the Royal Air Force

of Oman (RAFO) in the first half of October. The exercise included almost 250 British personnel comprising RAF regular, reserve and civilian contractors.

Detachment commander, Wg Cdr Billy Cooper said: "In two weeks of flying we

have flown 102 sorties. The Typhoons have performed exceptionally well with first-class maintenance from our engineers." He added: "Not only have my pilots been able to practise all the skills they need, but it has been a fantastic opportunity to work

in testing conditions for everyone, from our field caterers to armourers and the forward air controllers who call in air power."

The RAFO provided use of its training facilities and the Typhoons had access to ranges to drop precision-

guided bombs and to use the 27mm cannon as well as practising air defence alongside RAFO F-16s.

No 6 Squadron will deploy to RAF Akrotiri, to Cyprus, next year to support the coalition against so-called Islamic State.



A Voyager from RAF Brize Norton, Oxfordshire, transported the main deployment party to Thumrait, Oman. In the foreground is Typhoon FGR4 ZK316 '316', one of the eight No 6 Squadron jets deployed for Magic Carpet 17. Crown Copyright

First flight of Italian F-35B



Initially flown unmarked, F-35B BL-01 is understood to be destined for the Italian Air Force. Simone Bovi

THE FIRST Italian-built F-35B (BL-01) took its maiden flight at Cameri air base, home of the local Final Assembly and Check-Out (FACO) facility, on October 24 – the first short take-off vertical

landing (STOVL) variant of the Lightning II to be assembled outside the US.

The aircraft went on to complete a first full STOVL transition – including hovering on the runway – on October 30,

with a Lockheed Martin test pilot at the controls.

After delivery to the Italian defence ministry, BL-01 is due to conduct a series of 'confidence flights' from Cameri and will then be flown by an

Italian pilot to Naval Air Station Patuxent River, Maryland, where it will undergo electromagnetic environmental effects certification.

The Cameri FACO is due to assemble 60 Italian

F-35As and 30 F-35Bs for Italy's air force and navy plus 29 more 'As for the Royal Netherlands Air Force. A second Italian-assembled B-model is due to be delivered in November next year.

Portugal may opt for 'Viper' upgrade

PORTUGAL MAY modernise its F-16 fleet to F-16V configuration after the government in Lisbon authorised replacement of the current Multifunctional Information Distribution System (MIDS) Block Upgrade I by the AN/USQ-190(V)5(C) MIDS Joint Tactical Radio System (MIDS JTRS). An €8.7m contract



Above: Two FAP F-16s and a P-3 arrived at Lajes for a brief stay in the Azores on September 24. F-16AM 15135 touched down using the callsign 'FALCN 42', accompanied by F-16AM 15117 'FALCN 41' and P-3C 14808 'RESCUE 24'. André Inácio

has been signed with the US authorities, with payments to be made between 2017 and 2020. Full modernisation of the 30 Força Aérea

Portuguesa (FAP) F-16s to F-16V configuration will cost around €500m, or €16.6m per aircraft, depending on the new equipment to be acquired.

However, without a current plan to acquire new fighters, it's possible Portugal will choose the F-16V modernisation package. **Jose Matos**

More Holloman Tornados return

THREE MORE Holloman-based Luftwaffe Tornados returned to Germany on September 13 – 44+34 (with special 'Last Flight 11.09.17' markings), 45+35 (German Air Force Flying

Training Center markings) and 45+61 (Taktisches Luftwaffengeschwader 51 'Immelmann' markings).

They flew from Holloman Air Force Base, New Mexico, to Bangor International

Airport, Maine, on September 11 before proceeding non-stop to Germany two days later. Tornados 44+34 and 45+61 went to Büchel air base and 45+35 arrived at Manching.

Only four Tornados now remain at Holloman: 43+97, 44+30, 45+09 and 45+16. They will return to Germany in the near future. **Dietmar Fenners**



Tornado 45+35 arrived at Manching using the callsign 'Retro 34'. Dietmar Fenners

Special forces Black Hawks for Croatia

THE CROATIAN defence ministry confirmed on October 27 it's negotiating with the US to acquire two UH-60s for use by the Zapovjedništvo Specijalnih Snaga (ZSS, Special Forces Command), based at Delnice. The helicopters are expected to come from US Army stocks, as with the 16 OH-58Ds delivered to the Hrvatsko Ratno Zrakoplovstvo i Protuzračna Obrana (HRZ i PZO, Croatian Air Force) in 2016.

This acquisition also points to a possible replacement for the air force's Mi-171Sh helicopters – Croatia having acquired ten new ones in 2007-08 as compensation for Russia's debt to the nation, but it has been unable to find a certified overhaul centre outside Russia.

As a NATO and EU member, Croatia is reluctant to award the €27.6m overhaul contract to a Russian company, but there appear to be few other options as all ten helicopters have been grounded since mid-2017.

Croatia is now interested in replacing its Mi-8/17s with a Western type in the near future. **Vladimir Trendafilovski**

Former Russian MiG-29s arrive in Serbia

THE FIRST photos have emerged of six MiG-29s donated to the Ratno Vazduhoplovstvo i Protivvazduhoplovna Odbrana (RV i PVO, Serbian Air Force and Air Defence) by Russia in late December 2016. All had arrived in Serbia by early October after delays resulting from Serbian elections and establishment of a new government earlier this year.

The six *Fulcrums* have been repainted and carry new RV i PVO markings and serial numbers, while all sensitive equipment (including Russian IFF systems) has been replaced with export variants.

On October 2 an An-124-100 heavy transport of Volga-Dnepr Airlines left Tretyakovo Airport near Moscow, arriving at Batajnica air base later that day with the first pair of single-seat MiG-29s aboard – serials 18151 and 18201. It made two more trips in the next two days, bringing the remaining four jets – single-seaters 18202 and 18203 on October 3 and two-seat MiG-29UBs 18351 and 18352 the following day.

After its official acceptance in Serbia, 18201 returned to Russia aboard the same An-124 for overhaul at the 121 Aviatsonnyy Remontnyy Zavod (ARZ, Aircraft Repair



Above: Five 'Fulcrums' were present at the Sloboda 2017 (Freedom 2017) exercise which demonstrated the capabilities of the Serbian armed forces at Batajnica on October 20. *Dimitrije Ostojic*

Plant) in Kubinka after the last pair of MiG-29s had arrived, departing Batajnica early on October 5.

The aircraft will not enter service immediately. First, all six will undergo modernisation at the Moma Stanojlović aircraft repair plant with the assistance of Russian specialists, and will be fitted with the same ICAO-

compatible navigation and communication equipment found on Serbia's current four MiG-29s.

The process should be complete by the second half of next year, in time for the six ex-Russian aircraft to enter operational service and the original four Serbian aircraft to

depart for an overhaul.

Meanwhile, spare parts and weapons should arrive from Russia as part of the original agreement, and the follow-on modernisation agreement with manufacturer RAC MiG is expected to be signed as soon as all the details are defined.

A separate donation of eight additional MiG-29s

from Belarus (see *Serbia to acquire MiG-29s from Belarus*, March 2017, p11) has also been delayed by Serbia's political situation. However, President Aleksandar Vučić was expected to pay an official visit to Belarus in November, when the agreement will be finalised and signed.

Vladimir Trendafilovski

Former Russian MiG-29s delivered to RV i PVO (by date of production)

Serbian serial	Russian serial (RF code)	c/n	Variant	Produced	Remarks
18151	14 Blue (RF-92185)	2960526364	MiG-29 (9.12A)	01.1989	Overhauled 2013. In Serbia (awaiting modernisation).
18201	04 Blue (RF-93709)	2960727445	MiG-29 (9.13)	07.1989	Overhauled 2010. In Russia (awaiting overhaul).
18202	31 Blue (RF-93713)	2960728107	MiG-29 (9.13)	08.1989	Overhauled 2014. In Serbia (awaiting modernisation).
18203	10 Blue (RF-93717)	2960728141	MiG-29 (9.13)	12.1989	Overhauled 2014. In Serbia (awaiting modernisation).
18351	101 Blue (RF-29166)	50903019679	MiG-29UB (9.51)	10.1990	Overhauled 2013. In Serbia (awaiting modernisation).
18352	75 Blue (RF-92196)	50903025459	MiG-29UB (9.51)	09.1991	Overhauled 2014. In Serbia (awaiting modernisation).

Austrian PC-6s operating in Bosnia



Above: Wearing EUFOR titles, Austrian Air Force PC-6/B2-H2 3G-EE taxis in at the newly refurbished airstrip at Archer Base, Camp Butmir, Sarajevo, on August 23. *EUFOR*

A PREVIOUSLY unpublicised deployment of two Austrian Air Force Pilatus PC-6/B2-H2s to Bosnia and Herzegovina has recently come to light. The aircraft, from the Light Air Transport Squadron at Tulln-Langenebarn, have been based at

Sarajevo International Airport since April, but their presence was little known until August 23 when they flew in for the official recommissioning ceremony of the airstrip at the European Union Force (EUFOR) Operation Althea headquarters at

Archer Base in Camp Butmir, Sarajevo.

The Turbo Porters will remain at the site, from where they can launch at short notice and will not be restricted by having to deconflict with airline traffic at the international airport.

Additionally, soldiers with their equipment can board the aircraft directly from assembly areas in Camp Butmir, increasing quick reaction capability. The base already accommodates EUFOR's rotary-wing assets, but will now also be able to carry

out fixed-wing operations.

Austria has for many years supplied military helicopters to support EUFOR operations, having previously operated its Alouette IIIs from Camp Butmir and, more recently, AB212s and Black Hawks. **Dave Allport**

Bulgaria to repeat fighter tender



Above: BVVS Su-26s during the multinational Exercise Saber Guardian 17 which took place in Hungary, Romania and Bulgaria earlier this year. Chavdar Garchev

Contract award for German P-3C upgrade

LOCKHEED MARTIN has received a \$158.5m contract to upgrade eight German P-3Cs to ensure the Marineflieger (naval air arm) Orion fleet remains operationally capable until 2035.

Announced on November 1, the programme will address the mission system processing suites via installation of the Lockheed Martin Airborne Tactical Mission System, and is part of an overall fleet modernisation which includes structural mid-life upgrades as well as improvements to the instrument flight rules (IFR) cockpit capability.

Germany's P-3 Mission System Refresh programme began in 2016 when the US Navy awarded manufacturer Lockheed Martin an initial \$54.9m Foreign Military Sales contract for design and development work.

The latest contract award will take the programme from preliminary design review through to completion in 2022.

BULGARIA HAS revised plans to procure a new fighter, defence minister Krasimir Karakachanov confirming on October 5 that only new-build aircraft will be considered, with payments made over an extended period. Meanwhile consideration will be given to a general overhaul and modernisation of the existing MiG-29 and Su-25 fleets.

Only hours after his statement, the Bulgarian National Assembly approved a report prepared by a

parliamentary committee tasked to probe the procedure for selection of a new fighter. It allegedly identified serious shortcomings in the process that led to Saab's offer of newly produced JAS 39C/D Gripen fighters being judged the best, and recommended that the defence ministry repeat the tender process.

Three bids had been received before the procedure was put on hold: the new Gripens from Sweden, second-hand F-16AM/BM Block 15s from Portugal and former

Italian Air Force Eurofighter Tranche 1s from Italy.

The committee report means a serious delay in acquiring a new fighter. The Bulgarski Voenovozdushni Sili (BVVS, Bulgarian Air Force) relies on a fleet of 12 single-seat MiG-29A (9.12A) fighters and three two-seat MiG-29UB (9.51) trainers. Of these, only eight were operational at the beginning of June.

Selection of a fighter is unlikely to be completed before mid-2018, leaving the BVVS without new equipment before 2020 at the earliest. So Bulgaria

may well be forced either to call on Russian support for a general overhaul and modernisation of the existing fleet of 15 MiG-29s and 14 Su-25s at the local, state-owned Avionams aircraft repair plant in Plovdiv – or request NATO assistance in maintaining the local air policing mission.

The Italian Air Force's Bulgarian Horse mission deployed four Eurofighters to Graf Ignatievo between July 15 and October 15 to help the MiG-29s protect Bulgarian airspace. **Igor Bozinovski**

First French C-130J rolls out

LOCKHEED MARTIN has unveiled the first of four C-130J-30s for France, the aircraft leaving the paint shop at its Marietta, Georgia production facility on October 20.

On December 1 last year the company received

\$133.4m and \$36.6m contracts for two stretched C-130J-30 airlifters; and for configuration changes to two C-130J-30 airlifters and two KC-130J tankers. Work is expected to be completed by August 30, 2020. A joint French-German unit based

at Évreux in France will operate the aircraft.

Two days before the rollout, French and German deputy chiefs of defence staff signed a co-operation agreement in Berlin for the joint C-130 unit, which will operate four French and six German Hercules (the Bundeswehr

contributing around 200 personnel) and run a joint training centre.

The accord calls for the squadron to attain initial operational capability by 2021 and full operational capability in 2024. A corresponding government agreement is planned for the second half of 2018.



Greece and Italy to protect Montenegrin airspace

GREECE AND Italy are to begin air policing Montenegrin airspace on a 15-day rotational basis.

Montenegro's defence minister, Predrag Boskovic, announced the plan on October 30, explaining that negotiations are still under way for airspace protection to be provided free of charge under an arrangement similar to that enjoyed by Albania since 2009.

Hellenic Air Force jets conducted a high-altitude test patrol over NATO's 29th and latest member state on October 17. Montenegro also hopes to send officers to the Hellenic Air Force Academy in Athens.

Work is meanwhile in progress to overhaul the structure of the Vojaska Crne Gore (VCG, Armed Forces of Montenegro), and the Balkan nation's defence ministry plans to procure three utility helicopters capable of firefighting, search and rescue, emergency medical and evacuation missions.

The Vazduhoplovstvo Vojске Crne Gore (Montenegrin Air Force) operates from Golubovci air base at Podgorica International Airport. The small air arm maintains a mixed squadron equipped with 13 Yugoslav-made SA341/342 Gazelles, including five SOKO HN-45M Gazelle GAMA-2 (SA342L) anti-tank helicopters.

Currently no more than four aircraft are airworthy at any one time, but regular budget funds will be used for scheduled inspection and modernisation of the five GAMA-2s and two SOKO HO-42 Gazelle utility helicopters.

In total, €138m will be invested in upgrading Montenegro's military by 2025: €118m for equipment and €20m for infrastructure projects
Igor Bozinovski

Greek F-16V upgrade approved



Above: Hellenic Air Force F-16D Block 52+ serial 602 (99-1536) – from 340 Mira at Souda Bay – took part in Exercise Brilliant Arrow at Wittmund in Germany in September. *Henk de Ridder*

THE US State Department has approved a potential \$2.4bn upgrade package for Greece's F-16 fleet – the Defense Security Cooperation Agency notifying Congress of the sale on October 16.

The proposal would bring the Hellenic Air Force's existing 123-strong fleet of F-16C/Ds to F-16V standard and include up to 125 AN/APG-

83 active electronically scanned array (AESA) radars; a similar number of Modular Mission Computers (MMCs); Link 16 Multifunctional Information Distribution System – Joint Tactical Radio Systems (MIDS-JTRS); and LN260 embedded global navigation systems/inertial navigation systems.

Also included are up to 123 AN/APX-126 Advanced Identification Friend or Foe (AIFF) combined interrogator transponders, a Joint Mission Planning System (JMPS), one new F-16V simulator and the upgrade of two existing simulators. The Advanced Self-Protection Integrated Suite (ASPIIS) I suite on 26 aircraft would

meanwhile be updated to ASPIIS II configuration.

Greek Prime Minister Alexis Tsipras said the cost of the upgrade will be up to €1.1bn over the next ten years, suggesting only a portion of the fleet will be upgraded.

The Hellenic Air Force currently flies F-16s in Block 30, Block 50, Block 52+, and Block 52+ Advanced configurations.

UH-1Y Venom for Czech Republic

THE US State Department has approved the sale of UH-1Y utility helicopters to the Czech Republic, the Defense Security Cooperation Agency announcing the potential

\$575m Foreign Military Sale on October 23.

The Czech government has requested 12 UH-1Ys, 25 T700-GE-401C engines, 13 Honeywell embedded GPS/INS and 12 0.3in

(7.62mm) calibre M240 machine guns – plus the Brite STAR II forward-looking infrared system, AN/AAR-47 missile warning and laser detection systems, AN/

ALE-47 countermeasures dispensing systems and AN/APR-39 radar warning receivers. The package also includes helmet-mounted displays and additional GAU-17A and GAU-21 guns.



The first Slovakian C-27J, 1931/CSX62302, arrives at Malacky-Kuchyňa on October 24 after its delivery flight from Caselle.
Ministerstvo Obrany SR/Ivan Kelement

Slovakia's first C-27J delivered

SLOVAKIA HAS taken delivery of its first C-27J. The Spartan, 1931/CSX62302, one of two on order for the Vzdušných síl Ozbromených síly Slovenskej Republiky (VVzS OS SR, Air Arm of

the Armed Forces of the Slovak Republic) arrived at Malacky-Kuchyňa air base on October 24.

Formal handover was due on October 31. As previously reported, the aircraft had made its

maiden flight from the factory at Turin-Caselle, Italy, on August 7 (see *First flight for Slovak Spartan*, October, p11). The type will replace two An-26s which retired in 2016 and will be operated

by 1. Dopravná lektá (1st Transport Squadron) of the General Milana Rastislava Štefánika Transport Wing at Kuchyňa. Delivery of the second aircraft is scheduled for next year. **Dave Allport**

F-15E marks 4th FW 75th anniversary

US AIR Force F-15E 87-0189 'SJ' has been painted in a special heritage scheme to mark the 75th anniversary of the 4th Fighter Wing (FW) at Seymour Johnson Air Force Base, North Carolina.

Personnel from the 4th Equipment Maintenance Squadron fabrication flight took more than a month to complete the paint job on the Strike Eagle, which is flown by the 4th FW's 335th Fighter Squadron 'Chiefs'. The markings will be retained on the aircraft for a year. **Dave Allport**

F-15E 87-0189 'SJ' disconnects after refuelling from a 916th Air Refueling Wing KC-135R Stratotanker over North Carolina on September 14. USAF/Airman 1st Class Victoria Bayton



386th AEW debuts Block 5 Reaper

THE USAF's 386th Air Expeditionary Wing (AEW) has flown a first combat mission with the Block 5 MQ-9A Reaper remotely piloted aircraft (RPA). The mission was carried out during Operation Inherent Resolve by the wing's 46th Expeditionary Attack Squadron, which previously operated the MQ-1B Predator. Air Combat Command announced the milestone on October 20, but published photographs



Maintainers perform final pre-flight procedures prior to an MQ-9 Block 5 taking off for its first combat flight in support of Operation Inherent Resolve. USAF/Senior Airman Damon Kasberg

indicate the new RPA flew its first mission in the Middle East on June 23.

The MQ-9A Block 5 is

larger and more powerful than the MQ-1B Predator. It can fly higher and faster and carry more ordnance

– four Hellfire missiles and 500lb (227kg) bombs, compared with two Hellfires for the MQ-1.



An F-35C from VFA-125 conducts flight operations aboard the USS 'Carl Vinson' on October 18. US Navy/Mass Communication Specialist 2nd Class Sean M. Castellano

F-35C operates from USS Carl Vinson

THE US Navy has conducted another round of carrier flight operations for the F-35C. On October 18 a Lightning II from Strike Fighter Squadron (VFA) 125 'Rough Raiders', based at Naval Air Station Lemoore, California,

flew aboard as USS Carl Vinson (CVN 70) conducted carrier qualifications off the coast of Southern California. The F-35C landed on and launched from the carrier during day and night operations. As well as working towards

operational capability for the carrier variant, the trials also evaluated the aircraft's current helmet-mounted display system. The F-35C is scheduled to achieve initial operating capability for the US Navy late next year. USS Carl

Vinson was conducting fleet replacement squadron carrier qualifications. It is likely to be the first West Coast-based carrier to deploy with an F-35C squadron after undergoing a scheduled maintenance period in 2019.

US Coast Guard receives final HC-27J

THE US Coast Guard has received its 14th and final HC-27J Spartan medium-range surveillance aircraft. The HC-27J Asset Project Office (APO) in Elizabeth City, North Carolina, took delivery of CGNR 2705 on October 19. All of the service's HC-27Js have now undergone regeneration from storage.

In 2013, Congress directed the US Air Force to transfer 14 C-27Js to the Coast Guard. Thirteen Spartans, including CGNR 2705, underwent a regeneration process involving inspection, verification and repair completed by the 309th Aerospace Maintenance and Regeneration Group (AMARG) at Davis-Monthan AFB, Arizona. The APO also received a C-27J that underwent other work to prepare it for operations from vendor storage.

The Coast Guard is working with the Naval Air Systems Command to develop a missionisation package for the aircraft, which will use Minotaur mission system architecture to incorporate the sensors; radar; and command, control, communications, computers, intelligence, surveillance and reconnaissance equipment used to conduct Coast Guard missions. The first C-27J was delivered to Naval Air Station Patuxent River, Maryland, September 28 to begin the mission system integration process.

Of the Coast Guard's remaining 13 Spartans, seven are stationed at the HC-27J APO in Elizabeth City. Five are primarily used for training and maintenance procedure development, and two are undergoing regularly scheduled long-term maintenance. Meanwhile, six aircraft operate from Air Station Sacramento, California.

'Tuskegee Airmen' F-16s deploy to Southwest Asia



Above: F-16C 88-0398 'AL' 'City of Tuscaloosa' from the 100th Fighter Squadron arrives at Morón. Antonio Muñiz Zaragüeta

THE ALABAMA Air National Guard's 187th Fighter Wing deployed to Southwest Asia in support of Operation Inherent Resolve in October.

More than 300 airmen and six F-16C Block 30s from the 100th Fighter Squadron from Dannelly Field Air National Guard Base, Montgomery,

Alabama, have deployed to an unidentified location in the Middle East. On October 18, the F-16Cs passed through Morón Air Base in Spain en

route to the Middle East. Flying with the callsigns 'Tabor 91-86', the aircraft were: 87-0282, 87-0271, 87-0332, 87-0342, 88-0398 and 87-0220.

'War Eagles' depart Sigonella, 'Mad Foxes' arrive

THE US Navy's Patrol Squadron (VP) 16 has completed its deployment to the US Sixth Fleet area of operations. The 'War Eagles' had been at Naval Air Station Sigonella in Sicily, Italy, for a seven-month deployment. Attached to Commander, Task Force 67, the unit's P-8As supported 43 detachments across 15 countries including Denmark, France, Greece, Germany, Iceland, Lithuania, Norway,



Above: P-3Cs from VP-46 'Grey Knights' were also in Europe recently. The unit's aircraft made a night stop at RAF Mildenhall, Suffolk, apparently on their return to the US after a deployment to the Middle East. They arrived in two batches on October 1 and 5, and in each case departed the following day. The aircraft were P-3C AIP 159894 'RC 894' flying as callsign 'VVRCA411', P-3C AIP 'RC' 318 as 'VVRCA326', P-3C BMUP+ 161593 'RC' 593 as 'GK28', and P-3C BMUP+ 161411 'RC' 411 as 'VVRCA318'. The latter is seen with a Littoral Surveillance Radar System (LSRS) pod, during its departure on October 5. David Skeggs

Scotland, Spain and Ukraine. VP-16 began its transition back to NAS Jacksonville, Florida, in early October. During their time in theatre, the 'War Eagles'

also supported the George H W Bush Carrier Strike Group in its execution of strike missions from the eastern Mediterranean in support of Operation

Inherent Resolve. In total, 12 aircrews completed more than 4,500 flight hours. VP-5 'Mad Foxes' relieved the 'War Eagles' at Sigonella on October 10.

Unusual Orion at Mildenhall



David Skeggs

AN UNMARKED P-3SPA arrived at RAF Mildenhall, Suffolk, on October 10 as 'VVR610'. The callsign is that of a Scientific Development Squadron ONE (VXS-1) Orion from Naval Air Station (NAS) Patuxent River, Maryland, but the lack of

markings, serial number and absence of the pod fitted under the fuselage suggests that it may be a Special Projects P-3 from Marine Corps Air Station Kaneohe Bay, Hawaii.

The three digits '610' on the nose initially suggests the serial number is

160610. However, it seems more likely to be an unknown airframe operated by Special Projects Patrol Squadron TWO (VPU-2). Adding to the suspicion is the fact it was showing 160283 as its converted HEX code – the unique 24-bit code

assigned to each aircraft equipped with a Mode S transponder. The real 160283 was damaged and subsequently written off in 2014. It would not be the first time VPU-2 has used a serial from a 'dead' P-3 to confuse observers. **David Skeggs**

First KC-46 to KC-46 refuelling

A TEST team from Boeing and the USAF recently refuelled a KC-46A tanker from another KC-46A tanker for the first time. The manufacturer announced the milestone on October 11. During the 4hr flight, the two aircraft successfully refuelled each other and achieved the maximum fuel offload rate of 1,200 US gal (4,542 lit) per minute. The programme's first and second tankers transferred a total of 38,100lb (17,282kg) of fuel over the course of the flight. Both aircraft took off and landed at Boeing Field, south of Seattle.

The milestone flight helps pave the way for the next phases of certification and specification compliance testing.

The KC-46A programme's test aircraft have completed 2,000 flight hours and more than 1,300 contacts during refuelling flights with F-16, F/A-18, AV-8B, C-17, A-10 and KC-10 aircraft.

In late September, the USAF's Air Mobility Command revealed that boom scraping issues and uncompleted test points could delay delivery of the Pegasus until 2018.



Above: A KC-46A Pegasus tanker is refuelled by a second KC-46 for the first time as seen from the tanker's air refuelling operator station. Boeing

Lancers fly at night over Sea of Japan



Above: A B-1B Lancer assigned to the 37th Expeditionary Bomb Squadron takes off from Andersen AFB on October 10. USAF/Senior Airman Jacob Skovo

TWO USAF B-1Bs flew together with Japanese and South Korean fighters in the latest demonstration of US commitment to the two nations at a time of tensions with North Korea. On the night of October 9-10 the Lancers from the 37th Expeditionary Bomb Squadron, deployed from Ellsworth AFB, South Dakota, took off from Andersen AFB, Guam. They then flew bilateral missions with two Japan

Air Self-Defense Force F-15Js and two Republic of Korea Air Force F-15Ks in the vicinity of the Sea of Japan.

According to South Korea's news agency the bombers entered the Korean Air Defence Identification Zone (KADIZ) at around 2050hrs (local time) on October 9. They staged a simulated air-to-ground missile firing drill with the ROKAF Slam Eagles over the Sea of Japan and then flew across

the Korean Peninsula. The aircraft conducted another firing exercise over the Yellow Sea, with the bombers leaving the KADIZ at around 2330hrs. The flight marked the first time B-1s had flown combined training with Japanese and South Korean fighters at night.

The B-1s are deployed to Andersen as part of the USAF's continuous bomber presence in the Pacific, and have repeatedly flown training missions in the region.

Last C-130H leaves USAF's active-duty inventory

THE USAF has withdrawn its final active-duty C-130H. The aircraft was operated by the 36th Airlift Squadron, based at Yokota Air Base, Japan, which recently completed its conversion to the C-130J. C-130H 74-2065 flew the final tactical training sortie on October 5. The aircraft flew over the Izu Peninsula, where Mount Fuji is located, as well as the Japanese Alps, and the crewmembers

performed a Low-Cost, Low-Altitude (LCLA) airdrop at Yokota at the end of the mission.

Active-duty conversion to the C-130J began in 2014 and occurred at Dyess Air Force Base, Texas; Little Rock AFB, Arkansas; Ramstein AB, Germany; and Yokota. H-model Hercules transports continue to be flown by Air National Guard and Air Force Reserve units at more than 25 locations.



Crew from the 36th Airlift Squadron pose in front of C-130H 74-2065 at Yokota AB on October 5. USAF/Yasuo Osakabe

EXERCISE FORMIDABLE Shield 2017 (FS17) is a live-fire integrated air and missile defence (IAMD) scenario that took place on behalf of the US Sixth Fleet between September 24 and October 18. Warships from Canada, France, Germany, Italy, the Netherlands, Spain, the United Kingdom and the United States participated and defended against three subsonic anti-ship cruise missile targets on October 7. As well as the Mirach and Firejet targets launched from the UK Ministry of Defence's Hebrides Range, US Air Forces in Europe (USAFE) F-16s dropped AQM-37C Jayhawk supersonic drones to target the vessels.

Fixed-wing participants were hosted at RAF Lossiemouth and comprised three US Navy P-8As from Patrol Squadrons (VP) 10 and 45 and four USAF F-16CMs from the 510th Fighter Squadron based at Aviano Air Base in Italy as part of the 31st Fighter Wing. During the exercise the Aviano F-16s were crewed by 40th Flight Test Squadron pilots deployed from Eglin Air Force Base, Florida.

Exercise Formidable Shield in Scotland



F-16CM 88-0413 carries an inert AQM-37C for a mission from RAF Lossiemouth. Niall Paterson



Above: Gulfstream GII N779LC arrived at RAF Mildenhall on October 9 as 'HALO 4', accompanied by GII N78B 'HALO 2'. The aircraft are operated on behalf the Missile Defence Agency and were thought to be working with other assets as part of FS17. Chris Dorling

Spangdahlem 'Vipers' at Aviation Rotation 17-4 in Poland

SIX USAF F-16C/Ds from the 480th Fighter Squadron (FS), 52nd Fighter Wing (FW) from Spangdahlem AB in Germany trained together with Polish F-16C/Ds from the 31 Baza Lotnictwa Taktycznego (31st Tactical Air Base) at Poznan-Krzesiny during Aviation Rotation 17-4 from September 8 to 25.

"The 'War Hawks' came to Poland for three primary reasons: to exercise our readiness, to demonstrate our interoperability with the Polish military, and to bolster security efforts

within the European theatre," said Lt Col Mike Richard, 480th FS commander. The 52nd FW brought around 110 personnel to Poland for the exercise.

The rotational exercise is co-ordinated by the 52nd Operations Group Detachment 1, activated in November 2012 as the only permanent US Air Force unit stationed in Poland.

The 52nd OG Det 1's presence in Poland means the country can serve as a regional hub for air training and multinational exercises.



Krzysztof Kuska

'Gamblers' head to Bagram



Above: F-16CM 91-0380 'SW' was part of the second flight of 77th FS Fighting Falcons that arrived at Morón on October 21. Antonio Muñiz Zaragüeta

AIRMEN AND F-16CMs from the USAF's 77th Expeditionary Fighter Squadron deployed to Bagram Airfield, Afghanistan, in support of combat operations in the country on October 26. Deployed from the 20th Fighter Wing at Shaw AFB, South Carolina, the 'Gamblers' replaced the 555th EFS, from Aviano

AB, Italy, who were deployed to Bagram for the previous six months. "The number of strikes supporting ground forces in Afghanistan have increased over the last couple of months, reaching numbers not seen since 2012," said Col Stephane Wolfgeher, 455th Expeditionary Operations Group

commander.

Twelve F-16CMs from the 77th FS passed through Morón AB in Spain on October 21. Using callsigns 'Tabor 21-26' were: 92-3910, 90-0806, 91-0345, 91-0390, 94-0040, 90-0821; 'Tabor 31-36' comprised: 94-0044, 94-0046, 91-0364, 94-0043, 94-0047 and 91-0380.

Afghan Pave Hawks prepare to depart

US AIR Force HH-60G Pave Hawk personnel rescue helicopters of the 83rd Expeditionary Rescue Squadron (ERS) are preparing to leave Afghanistan. The mission will be taken over by a joint USAF and US Army Chinook rescue operation. On October 22, USAF pararescuemen

conducted a joint flight with army pilots on CH-47s at Bagram Airfield in preparation for the change. As a result, the 83rd ERS will become a joint unit with USAF pararescuemen and combat rescue officers working alongside US Army helicopters and pilots.

Below: An 83rd ERS HH-60G takes off from Bagram Airfield, Afghanistan, on October 22. USAF/Staff Sgt Benjamin Gonsler



Theodore Roosevelt deploys



THE US Navy's Nimitz-class aircraft carrier USS *Theodore Roosevelt* (CVN 71) departed Naval Base San Diego for a regularly scheduled deployment on October 6. The flagship of Carrier Strike Group (CSG) 9, *Theodore Roosevelt* was beginning a routine deployment.

The warship embarks the squadrons of Carrier Air Wing 17 (CVW-17), including Strike Fighter Squadron (VFA) 113 'Stingers' with F/A-18Es, VFA-94 'Mighty Shrikes' with F/A-18Fs, VFA-22 'Redcocks' with F/A-18Fs, Marine Fighter Attack Squadron (VMFA) 312 'Checkerboards' with F/A-18Cs, Electronic Attack Squadron (VAQ) 139 'Cougars' with EA-18Gs,

Carrier Airborne Early Warning Squadron (VAW) 116 'Sun Kings' with E-2Cs, Fleet Logistics Support Squadron (VRC) 30 'Providers' with C-2As, Helicopter Sea Combat Squadron (HSC) 6 'Indians' with MH-60S and Helicopter Maritime Strike Squadron (HSM) 73 'Battlecats' with MH-60Rs.

The strike group will focus on maritime security operations and theatre security co-operation efforts in both US Fifth and Seventh Fleet areas of operation.

Left: F/A-18E 168877 '300', Strike Fighter Squadron 113's 'CAG bird', flies over the USS *Theodore Roosevelt* that was sailing in the Pacific Ocean on October 26. US Navy/LT Aaron B Hicks

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Super Étendard Modernisés for Argentina



Seen in its final months of French Navy service, Super Étendard Modernisé serial 1 is among the five being transferred to Argentina for use as a spares source. M Mounica

ACCORDING TO the Argentine defence minister, five former French Navy Super Étendard Modernisé (SEM) fighters will be transferred to the Comando de Aviación Naval Argentina (COAN, Argentine Naval Aviation

Command) for use as a spares source.

The transaction includes the purchase of the materiel (€12.55m) and its transport to Argentina (€1.68m); the aircraft are SEMs serials 1 (built in 1978), 31 (1980), 41 and 44 (both

1981) and 51 (1982).

The jets will be provided with powerplants installed and another ten engines will be delivered as part of a spares package of 9,000 items. Also included are a flight simulator and test benches for calibration

and maintenance.

The COAN's fleet of 11 surviving Super Étendards has been stored for the last three years, and the spare parts from France will be used to bring them back to service.

Juan Carlos Cicales

Modernised Mi-35M2s for Venezuela

THE AVIACIÓN del Ejército Nacional Bolivariano – the Venezuelan Army's air arm – has accepted ten Mi-35M2 'Caribe' attack helicopters, returned after a programme of inspection and modernisation was completed.

Their official reception took place as part of the commemoration of the 12th anniversary of the Comando Estratégico Operacional de la Fuerza Armada Nacional Bolivariana (CEOFANB, Operational Strategic Command of the Bolivarian National Armed Forces), held on September 26 at El Libertador air base in Palo Negro, Aragua state.

Work on the helicopters was undertaken by Rostvertol, a subsidiary of Russian Helicopters.

Juan Carlos Cicales

Paramount Group ponders Pampa III

THE ARGENTINE defence ministry is negotiating with South African company Paramount Group over marketing the IA-63 Pampa III outside Latin America.

The talks aim to secure financial and strategic support to help sell the Pampa III to foreign markets. If the plan goes ahead, the company is also expected to commit



Above: An IA-63 Pampa III advanced jet trainer manufactured by the Fábrica Argentina de Aviones (FAdeA). Argentine MoD

to purchasing six aircraft for its own use. They would likely serve with the Paramount Aviation Academy, which provides

pilot training services to regional air forces.

In addition to a potential sale of the Pampa III to Bolivia (see *Bolivia*

may buy Pampa III, November, p20), talks are also being held with Paraguay and Uruguay.

Juan Carlos Cicales



Above: All ten of Venezuela's Mi-35M2s were originally delivered between July 2006 and January 2008. Their overhaul and upgrade began in 2015. Luis Guillot



Colombia integrates I-Derby ER on Kfir

THE FUERZA Aérea Colombiana (FAC, Colombian Air Force) has received at least six Rafael I-Derby ER air-to-air missiles from Israel.

Colombia is expected to buy more – using funds from the 2018 budget – providing for an initial total of 16 in the FAC inventory after a contract

for their acquisition was signed in January.

The I-Derby ER is being used to arm six FAC Kfirs upgraded with the Elta EL/M-2052 active electronically scanned array (AESA) radar. Another three Kfirs will be similarly upgraded under the 'Colosseum' project.

Juan Carlos Cicales

Left: The I-Derby ER missile incorporates a radio-frequency seeker and mid-course guidance updates, and has a maximum range of 62 miles (100km). Cess-Jan van der Ende



FAdA agrees to maintain C212s

THE FÁBRICA Argentina de Aviones (FAdA) is to maintain the C212 fleets of the Comando de Aviación de Ejército (CAE, the Argentine Army's air arm) and the Servicio de Aviación de Prefectura Naval Argentina (PNA, Naval Prefecture of Argentina).

Three C212s are currently operated by the army and five by the PNA. The FAdA will also offer maintenance services to other C212 operators in Latin America, where there's a potential market to support around 50 aircraft.

Juan Carlos Cicales

Above: FAdA's maintenance work will sustain C212 Aviocars that have been in service for 25-plus years. C212-300 PA-61 (c/n 382) is one of five of the type operated by the PNA at San Fernando, Buenos Aires. JM Barragán



Above: Some of the 20 ex-Carabinieri AB206s prior to delivery to the Argentine Army. EA

AB206s delivered to Argentine Army

THE ARGENTINE defence ministry has taken delivery of 20 AB206 helicopters to be assigned to the Comando de Aviación de Ejército (CAE, Argentine Army Aviation Command). Transferred from Italy's Carabinieri military police as part of plans to restore and expand CAE capabilities, they were formally handed over to Argentinean Ambassador Tomas Ferrari at the headquarters of the Heli World company

in Anagni, near Rome, on October 16.

According to CAE director Juan Gettig, the AB206s will be used for training and reconnaissance missions – with some armed with GAU-17 Miniguns and 2.75in (70mm) rockets once they arrive in Argentina.

The helicopters, which have undergone a service life extension programme adding ten years to their operational life, were purchased secondhand in 2013, but their delivery

schedule was delayed by administrative setbacks and a lack of funds.

The deal included the transfer to Italy of spare parts and tools for three CAE G222 transport aircraft that are in storage in Argentina.

The AB206s will be shipped to Argentina by sea and are expected to arrive before the end of the year. They will then undergo an inspection by an authorised workshop – probably the Fábrica Argentina de Aviones.



Above: SENAN personnel with their first Twin Otter Series 400 at Viking's factory in Victoria, British Columbia, Canada. Viking Air

Second Twin Otter for SENAN

THE PARAGUAYAN government has bought a second Series 400 Twin Otter from Viking Air, the Canadian company announced on October 10.

It will join another Twin Otter based in Cocolí with the Servicio Nacional Aeronaval (SENAN, Panama National Naval Air Service (SENAN), which was delivered last December.

The new aircraft, scheduled for delivery the end of the year, will be used to support humanitarian aid missions throughout the country.

Equipped with standard wheeled undercarriage for its primary role as a troop and cargo transport, it will also be configured for medical evacuation to support emergencies.

Colombia completing Tucano upgrade

THE CORPORACIÓN de la Industria Aeronáutica Colombiana (CIAC, Colombian Aviation Industry Corporation) is close to finishing upgrade work on the Fuerza Aérea Colombiana's (FAC's) T-27 Tucano fleet. As of late September, ten aircraft had been redelivered.

As well as upgrading the air force's 14 Tucanos, state-run CIAC is now offering its T-27M modernisation to

other operators including Guatemala and Honduras.

The modernised T-27M features new avionics including a digital cockpit with twin multifunction displays along with structural improvements.

CIAC gained certification from Embraer in 2015 to modernise the type, and work is carried out after the T-27 exceeds 80,000 flying hours, extending service life by 15 years.



Above: A Colombian Air Force T-27 Tucano undergoes the upgrade to T-27M standard at CIAC facilities. CAMAN

Silver Stars at Tanagra

ATHENS FLYING Week included a first European airshow appearance for the Egyptian Air Force's Silver Stars display team. The event took place at Tanagra air base on September 16 and 17. The Egyptian team brought all ten of its K-8Es to the show, which also saw

participation by the Royal Air Force's Red Arrows. Egypt's K-8s were ordered in two batches of 80 and

40 aircraft. The 120th and final K-8E was accepted in a formal ceremony to mark the completion of the co-production programme in May 2010. The Silver Stars are manned by instructors from the Air Academy based at Bilbays.

Joachim Schmidt

Loaned Nigerian Mushshaks returned to Pakistan

FOUR PAC Super Mushshaks that were loaned to the Nigerian Air Force (NAF) by the Pakistan government as interim aircraft pending delivery of new production examples have been returned to Pakistan. They were flown out of NAF Base Kaduna on October 23 in an Il-76 transport aircraft. The NAF had used them for ab initio flying training of pilots with 401 Flying Training School (FTS) at Kaduna. This made it possible to start training NAF pilots on the type in December 2016, prior to delivery of ten new Super Mushshaks

that were ordered on October 21 last year. They were loaned at no extra cost to Nigeria.

The loaned aircraft were used to train four instructor pilots and graduate 16 ab initio student pilots at 401 FTS.

The first five of the new-build aircraft were delivered to Kaduna on July 14 on board an Il-76 (see *Nigeria receives new-build Super Mushshaks*, September, p22). They were formally inducted into service on August 8. The remaining five on order are expected to arrive in Nigeria before the end of the year. **Dave Allport**

New helicopters delivered to Mali

RUSSIAN HELICOPTERS has completed delivery of two Mi-35M attack helicopters for the Armée de l'Air Malienne (Mali Air Force). This was confirmed by an October 3 press release from the holding company. The two aircraft, serials TZ-13H and TZ-14H, were produced under a contract with Rosoboronexport, Russia's state arms export agency, and were first seen in Russia in spring this year. They arrived on September 21 after being airfreighted from Russia.

During a visit to Base Aérienne 101 Bamako-Sénou International Airport on the same date, President Ibrahim Boubacar Keita announced that another two Mi-35Ms were expected to arrive in the near future.

Another recently acquired asset, AS332L Super Puma TZ-22H, was also on show at the event. It was one of two purchased second-hand from the manufacturer for \$18m. This is almost certainly the former G-BWMG

(c/n 2046) of Bristow Helicopters, acquired from Airbus Helicopters and cancelled from the UK register on March 2 this year as sold in Mali. It was seen at Lanzarote, Spain, on January 4 during its delivery flight, still wearing its UK registration. It joins another AS332L, TZ-21H, which was officially accepted in a ceremony at Bamako on October 17 last year. This is believed to have previously been ZS-RTS (c/n 2122) operated by Starlite in South Africa.

Interesting participants in Exercise Blue Kunene

EXERCISE BLUE Kunene, staged by the Southern African Development Community (SADC), was held in Namibia between August 24 and September 4. SADC member states sent a variety of aircraft to participate in the exercise.

Ten air forces from the region deployed 23 aircraft, which flew over 350 hours during the exercise. Host nation Namibia participated

with Cheetah and Chetak helicopters, plus a Y-12 transport. Also taking part were the Angolan Air Force (An-72, Il-76, Mi-24 and several Mi-171Sh); Botswana Defence Force (Bell 412, CN235 and C-130 Hercules); South African Air Force (two C212s, one C-130BZ, one King Air and three Oryx helicopters); Tanzanian Air Force (Y-12); and Zimbabwe Air Force (C212). **Dave Allport**



Above: One the two newly delivered Mali Air Force Mi-35Ms, TZ-14H, on display during the ceremony at Bamako on October 3. *Presidence Mali*



Namibian HAL SA315B Cheetah H-703 takes off on August 29 while taking part in Blue Kunene. The type is flown by 151 Squadron at Windhoek-Eros Airport. This is believed to be the only example remaining in service. *Namibian MoD*

Angolan Cessna 501 MPA delivered



Above: Angolan Air Force Cessna 501 Citation I/SP N54FT after being modified as an MPA by Israel's Bird Aerosystems. Its Angolan markings had already been applied at the time this photograph was taken, but the company has censored them to hide the identity of the customer. *Bird Aerosystems*

A CESSNA 501 Citation I/SP modified as a maritime patrol aircraft (MPA) has entered service with the Angolan Air Force. Israel's Bird Aerosystems announced on October 14 that it had recently delivered another of its Airborne Surveillance, Information and Observation (ASIO) multi-segment task force packages to an African country, but did not identify the operator. Other sources have confirmed this is the

Angolan aircraft. The ASIO system is installed on 1979-built Cessna 501 N54FT (c/n 501-0100), the US registration of which was cancelled on January 19 following sale to Angola. The Citation was noted in Israel at Megiddo Airport on January 6, already wearing full Força Aérea Nacional de Angola (FANA, National Air Force of Angola) titles and markings, but still carrying its US registration. It had entered service in Angola by August. **Dave Allport**

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IAF AH-64s return to the air

THE ISRAELI Air Force (IAF) has lifted the grounding order on its fleet of AH-64s. The helicopters began flying again on October 22, after being grounded for two months following an August 7 accident, in which AH-64A pilot Major (res.) David 'Dudi' Zohar was killed and his co-pilot badly injured. The IAF confirmed the AH-64s would be "gradually returned to operational fitness" after flights resumed at Ramon Air Base, in line with recommendations from the interim report into the accident.

The IAF confirmed the cause of the crash was a steering problem, after elements of the rear rotor controls weakened over an extended period, before becoming dislodged during the flight. The malfunction had not previously occurred anywhere else in the global Apache fleet. It was not related to an earlier IAF AH-64D crash in June.

Ex-RNLAF F-16s delivered to Jordan



Above: RJAF F-16AM 243 (ex RNLAF J-872) taxis to runway 24 at Volkel Air Base in the Netherlands ready for the first leg of the delivery flight to Al Azraq AB. *Kees van der Mark*

THE FIRST six of 15 former Royal Netherlands Air Force (RNLAF) F-16s sold to Jordan were delivered to the Royal Jordanian Air Force (RJAF) in late October (see *Dutch F-16s readied for Jordan*, October, p20). Taking off from Volkel Air Base in the Netherlands on October 25, the jets – comprising F-16BM 236 (ex J-884, 81-0884) and F-16AMs 240 (J-638, 80-3638), 243 (J-872, 81-0872), 244 (J-873, 81-0873), 247 (J-199, 83-1199) and

248 (J-145, 85-0145) – routed to their new home base Al Azraq via Aviano Air Base in Italy and Souda Bay, Greece.

Two spare aircraft – F-16BM 237 (ex J-208, 83-1208) and F-16AM 250 (J-510, 87-0510) – stayed behind on the flight line. They will join one of the two other groups scheduled to fly to Al Azraq before mid-December, also including F-16AMs 238 (ex J-623, 80-3623), 239 (J-637, 80-3637), 241

(J-868, 81-0868), 242 (J-870, 81-0870), 245 (J-876, 81-0876), 246 (J-193, 83-1193) and 249 (J-057, 86-0057).

The F-16s are being transferred to the RJAF under the Peace Falcon VI programme, as part of a €76.46m deal signed between the Netherlands and Jordan on December 17, 2013. Also included in the agreement are support equipment and spare parts, as well as training of technical personnel and pilots. RJAF pilots

flew training missions from Leeuwarden Air Base for two weeks in late September/early October, using F-16BMs J-208 and J-884 and F-16AM J-872.

The former Dutch F-16s will re-equip Al Azraq-based 2 Squadron, which previously operated 16 ex-US Air Force F-16A/B Block 15 ADFs delivered from 1997-98 under the Peace Falcon I programme. The 13 surviving aircraft were transferred to the Pakistan Air Force in 2014.

Kees van der Mark



Peter R Foster

F-15SA down low

ROYAL SAUDI Air Force (RSAF) F-15SA 12-1004 flying at low level while on a test flight from the Boeing Palmdale facility in October. Palmdale test work has mainly involved four new-

build Saudi Advanced versions, 12-1001 to 12-1004, one of which has subsequently returned to St Louis, Missouri in preparation for delivery. Other examples have sporadically visited

Palmdale for test duties. As well as the new builds, F-15SA upgrade evaluations were carried out and tested on a pair of earlier F-15S airframes, 93-0857 and 93-0899. Both aircraft

were subsequently delivered back to Saudi Arabia, passing through RAF Lakenheath in December 2016 (see *Saudi F-15SA deliveries commence*, February p24). **Peter R Foster**

Qatar adds Hawks to Typhoon deal

QATAR'S POTENTIAL Typhoon contract also includes six Hawk Advanced Jet Trainers (AJT).

On September 17 Qatar signed an intergovernmental agreement signalling its intent to buy 24 Typhoons and six Hawk aircraft from BAE Systems, although plans to acquire the trainers were not previously reported (see *Qatar signs statement of intent for Typhoon*, November, p6). Should the deal proceed, the Hawks would replace the Qatar Emiri Air Force's fleet of six Alpha Jet Es, in service since 1980, and support the 24 PC-21 turboprop trainers that entered service from October 2014. A potential follow-on Hawk AJT order from Saudi Arabia is also still under negotiation.

Saudi AWACS modernisation under contract

THE US Department of Defense has awarded a fixed-price-incentive firm contract to Boeing to upgrade the Royal Saudi Air Force's five E-3A Sentry aircraft.

The first phase of the Airborne Warning And Control System (AWACS) modernisation programme is valued at \$240m. The Foreign Military Sales

(FMS) contract will provide an upgrade for AWACS mission computing, navigation and communications systems, as well as the new-generation

identification, friend or foe (IFF) equipment.

Work will be undertaken in Oklahoma City, Oklahoma, and is expected to be completed by February 28, 2019.

Two more Omani Typhoon deliveries

AN ADDITIONAL pair of Typhoons has been delivered to the Royal Air Force of Oman (RAFO) by BAE Systems. The single-seat aircraft, 211/ZR402 (NS002) and 212/ZR403 (NS003), departed from the factory airfield at Warton, Lancashire, on their delivery flights on October 9.

This brings total RAFO deliveries to date to six, from an order for 12 aircraft – three twin-seaters and nine single-seaters. The first two, 200/ZR410 (NT001) and 201/ZR411 (NT002), both twin-seaters, left Warton on June 19 (see *Oman's first Typhoons delivered*, August, p24). A further pair left Warton on August 7, comprising single-seater 210/ZR401 (NS001) along with the last of the three twin-stick aircraft on order, 202/ZR412 (NT003). Of the six single-seat aircraft still to be delivered, four are already test flying

at Warton. Of these, 213/ZR404 (NS004) first flew on June 13, followed by 214/ZR405 (NS005) on July 4, 215/ZR406 (NS006) on August 22 and 216/ZR407 (NS007) on September 7. Progress is also being

made on the RAFO order for eight Hawk Mk166s. As previously reported, the first two, 162/ZB124 (OM002) and 163/ZB125 (OM003), left Warton on July 24 and arrived on the island of Masirah,

off the coast of Oman, five days later – see *New Hawks delivered to Oman*, September, p24, and *Hawk Mk166 in Oman*, October, p20. A further pair, 161/ZB123 (OM001) and 164/ZB126 (OM004), left

Warton on September 25 on delivery. All four of the remaining aircraft are now test flying at Warton, the last one to fly being ZB130 (OM008), which made its maiden flight on October 17. **Dave Allport**



Royal Air Force of Oman Typhoons 211/ZR402 and 212/ZR403 lined up on the runway at Warton prior to departing on their delivery flights. William Jardim

UAE Black Hawk deploys to US



Above: Aviators and crew chiefs from the UAE JAC gather in front of their UH-60 at the end of an air assault mission at the National Training Center during Decisive Action Rotation 17-09, on September 21. US Army/Sgt David Devich, Operations Group, National Training Center

A UNITED Arab Emirate Joint Aviation Command (JAC) UH-60 recently deployed to the US, along with a significant contingent of JAC personnel, for combined training with their US counterparts. They arrived at the National Training Center (NTC) in Fort Irwin, California, to join Decisive Action Rotation 17-09 from September 9-22. The UAE JAC partnered with Task Force Saber, led by the 2nd Squadron, 6th Cavalry Regiment, 25th Combat Aviation Brigade, to conduct a wide range of missions.

In addition to training at

the NTC, another UAE JAC Black Hawk participated in the joint Exercise Iron Magic 18, during October, in the Fifth Fleet area of operations. This is a combined-arms live-fire bilateral engagement that aims to expand levels of co-operation, enhance mutual maritime capabilities, and promote long-term regional stability and interoperability between US forces and the UAE armed forces. It included a JAC UH-60 performing deck-landing qualifications on the amphibious dock landing ship USS *Pearl Harbor* (LSD 52), off the coast of the UAE. **Dave Allport**

Bahrain signs deal for F-16V

BAHRAIN HAS signed a \$3.8bn contract for F-16Vs, according to its state news agency. The deal, reported on October 18, is reportedly for 16 new Fighting Falcons. Bahrain originally requested 19 F-16Vs, valued at \$2.785bn. In addition to new-build aircraft, the US has approved an additional \$1.082bn upgrade to bring 20 F-16C/Ds to F-16V configuration.



Carl Richards

LOCKHEED MARTIN flew the final F-16 to be built at its Fort Worth, Texas, facility on October 19. The Iraqi Air Force F-16C

Block 52, serial 1636 (RA-28, 13-0031), is the last of the 28 single-seaters on order for Iraq. Baghdad also ordered

eight two-seat F-16Ds. Lockheed is moving the F-16 production line to Greenville, South Carolina at the end of

the year. Around 3,600 F-16s were built in Fort Worth with more than 4,500 delivered in total. **Carl Richards**

Siberian Foxhound

EARLIER THIS year a trio of Vozdušno-Kosmicheskiye Sily Rossiyskoy Federatsii (VKS RF, Russian Federation Air and Space Force) MiG-31s was temporarily deployed to Tolmachevo Airport. The Novosibirsk facility is the administrative centre of both the Novosibirsk Oblast and the Siberian Federal District. One of the aircraft, MiG-31DZ '19 Blue' (RF-95455) was

photographed parked, adjacent to the main runway, on alert for a rapid departure. The traditional Kamaz support vehicle is connected to the MiG-31, which is armed with R-33 (AA-9 Amos) and underwing R-60 (AA-8 Aphid) air-to-air missiles.

Tolmachevo houses a large military facility and its strategic position serves a dual purpose:

military aircraft transiting Russia require refuelling and servicing, and the facility supports all current types in the inventory. In addition, Novosibirsk is relatively close to China, Kazakhstan and Mongolia. Despite generally good relations with all three, the airfield nevertheless provides an important defensive capability. **Bob Archer**



Bob Archer

Russia plans to modernise Mi-26

THE RUSSIAN defence ministry has unveiled plans to modernise the Mi-26 helicopter. Russian Helicopters has prepared an upgrade package for the Russian Federation Air and Space Force fleet, said a statement released on October 22. Work is under way to create a prototype of the new Mi-26T2V

for flight tests. The modernised helicopter will retain a crew of five but will be better suited to operations in demanding climatic conditions. The upgraded *Halo* will also receive a revised self-defence suite. Specific items of equipment to be introduced include an NPK90-2 radio navigation system.

Below: Russian Helicopters' Mi-26T2V '901 White' (c/n 34001212096) at the International Aviation and Space Salon (MAKS) 2017 in July. The upgrade will apparently bring existing Russian aircraft up to a similar standard. *Robert Kysela*



Russian-Serbian BARS-2017 exercise

THE BARS (Bratstvo Aviatorov Rossii i Serbii, Brotherhood of Aviators of Russia and Serbia) is a series of joint annual exercises. It is held by the

Russian Federation Air and Space Force and the Ratno Vazduhoplovstvo i Protivvazduhoplovna Odbrana (RV i PVO, Serbian Air Force

and Air Defence).

Dubbed BARS-2017, this year's (third) edition was held at the Lipetsk-2 air base near Lipetsk – home of the 4 Gosudarstvennyy Tsentr Podgotovki Aviatsionnogo Personal i Voyskovykh Ispytaniy Ministerstva Oborony Rossiyskoy Federatsii (GTSPAP i VI MO RF, State Training Centre for Aviation Personnel and Military Tests of the MoD of the Russian Federation). During the exercise, from October 3 to 7, mixed VKS and RV i PVO crews on MiG-29s and Mi-8s conducted missions as part of a counter-insurgency

operation involving Russian special forces.

The VKS provided 11 Mi-8MT, Mi-8MTV-5 and Mi-8AMTSh helicopters plus nine MiG-29SMT, MiG-29UB and MiG-29UBM aircraft – most of the latter from the local unit. The RV i PVO was represented by 14 pilots of 204. vazduhoplovna brigada (vbr, aviation brigade) from Batajnica air base – MiG-29 pilots from 101. lovačka avijacijska eskadrila (lae, fighter aviation squadron) and Mi-8 pilots from 890. mhe (mešovita helikopterska eskadrila, mixed helicopter squadron). **Vladimir Trendafilovski**



A mixed Russian-Serbian crew prepares to take off from Lipetsk-2 aboard MiG-29UBM '39 Red' (RF-92231, c/n 50903029437) on October 3. The aircraft is armed with a pair of 20-shot B-8M rocket pods. *Serbian MoD via author*

New colours for An-132D prototype

ANTONOV HAS painted its An-132D prototype, UR-EXK, in a new colour scheme reflecting the programme's partnership with Saudi Arabia. The new white and green livery, unveiled on October 10, incorporates the logo of Saudi Arabia's 'Vision 2030' programme. Vision 2030 is the kingdom's roadmap for development and economic objectives over a 15-year

period. The An-132D forms part of this programme, with plans to set up a local production line for the type in Saudi Arabia.

The An-132D made its first flight from Kiev-Svyatoshino Airport, Ukraine, on March 31 (see *Maiden flight of An-132D prototype*, June, p26). An initial six-aircraft deal has been agreed with the Royal Saudi Air Force. **Dave Allport**



Above: New colours: An-132D demonstrator UR-EXK, complete with 'Vision 2030' logo and titles. *Antonov*

Russia to pursue Il-276 airlifter

RUSSIA PLANS to continue developing the former Il-214 Multi-role Transport Aircraft (MTA) under the Il-276 designation. The joint Russian-Indian MTA was dealt a blow in late 2015 when India announced withdrawal from the project. The Russian armed forces reportedly have an initial requirement for 55 aircraft. The twin-engined Il-276 has a take-off weight of just over 60 tonnes and a payload of 20 tonnes.

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Marine Corps Surion debuts at ADEX

KOREA AEROSPACE Industries (KAI) publicly demonstrated a new version of the KUH-1 Surion for the Republic of Korea Marine Corps (ROKMC) at the International Aerospace

& Defense Exhibition (ADEX) at Seoul from October 17 to 22. KAI received a contract last year to build Surions for the ROKMC over a three-year period. The marines have a total requirement

for 40 helicopters, but a KAI source has revealed to *AFM* that the initial contract is for 28 units. Production started earlier this year and the first unit will be handed over to the marines in December.

The main differences on this version include an internal auxiliary fuel tank, inflatable flotation devices on the bottom of the fuselage and folding rotor blades. **Gordon Arthur**



Gordon Arthur

Contract award for Japanese Global Hawk

NORTHROP GRUMMAN Aerospace Systems has received a \$130.5m contract from the Air Force Life Cycle Management Center associated with Japan's RQ-4 Global Hawk programme.

The October 5 contract provides for purchase of long-lead materials for three Block 30 RQ-4B air vehicles, two ground control elements, enhanced integrated sensor suites, spares and site survey work.

Myanmar Air Force Mi-24P repaired

RUSSIAN HELICOPTERS has repaired the first of four Myanmar Air Force Mi-24Ps under contract. The work is being completed at Aircraft Repair Plant No 419 in St Petersburg, according to a company statement released on October 13. A team of specialists from the plant were due to arrive in Myanmar in October to complete work on the remaining three aircraft.

Russian Helicopters maintains Myanmar currently operates around ten Mi-24Ps as well as Mi-2 and Mi-17 aircraft.

Japanese jets under test



Hans den Uyl

TWO PHOTOGRAPHS taken at Gifu Air Base on October 5 show continued trials of the Mitsubishi

Heavy Industries (MHI) X-2 stealth technology demonstrator and flight test of the second

locally assembled F-35A Lightning II.

The X-2, serial 51-0001, was flying with a rear-

fuselage housing for a spin recovery 'chute. Developed under Japan's Advanced Technology Demonstrator - Experimental (ATD-X) programme, the X-2 first flew on April 22, 2016. Since then it has been under test at Gifu, home of the Japan Air Self-Defense Force (JASDF) Air Development & Test Wing.

The second Mitsubishi-assembled F-35A for the JASDF is 79-8706. The fighter made a touch-and-go at Gifu with F-15DJ 12-8078 flying alongside as chase plane.

The F-35A had taken off an hour earlier from nearby Nagoya, home of the Mitsubishi factory, on what was reportedly its first flight.

Following assembly of the first four JASDF F-35As (AX-1 to AX-4) in the US, the remaining 38 will be built at Nagoya.



Hans den Uyl

Indonesian F-16s deploy to Australia

SIX TENTARA Nasional Indonesia – Angkatan Udara (TNI-AU, Indonesian Air Force) F-16C/Ds from Skadron Udara 3 at Lanud Iswahyudi, Madiun, Java, were deployed to Royal Australian Air Force (RAAF) Base Darwin,

Northern Territory, to take part in Exercise Elang Ausindo 17 from October 16 to 27. Support was provided by a TNI-AU C-130 Hercules. The bilateral training exercise between Australia and Indonesia, held regularly since 1995, was previously

hosted by RAAF Base Darwin in 2009 and 2013.

Eight F/A-18A Hornets from the RAAF's No 75 Squadron at RAAF Base Tindal, Northern Territory, were also deployed to Darwin to participate in the exercise, which is designed to enhance,

develop and promote international engagement between the RAAF and TNI-AU. Missions included dissimilar air combat engagements, taking place off the coast to minimise the environmental impact on residents. **Dave Allport**



Skadron Udara 3 F-16C TS-1632 taxis out at RAAF Base Darwin on October 18 to fly a joint mission with RAAF No 75 Squadron F/A-18As during Exercise Elang Ausindo 17. SGT Rob Hack/Commonwealth of Australia

Japan to donate five TC-90s to Philippines

REPORTS IN the Japanese media confirm a Japan Ministry of Defense plan to donate Beechcraft TC-90 training aircraft to the Philippines. Among them are two aircraft currently on lease to the Philippines and three that were due to be leased from next March. All five of the former Japan Maritime Self-Defense Force aircraft will be handed over at the end of March 2018. The deal follows a change in Japanese law that permits second-hand defence materiel to be transferred to developing countries as aid. The agreement was made on October 23.

Cobras for Korean Marine Corps

BELL HELICOPTER has offered the AH-1Z Cobra for a Republic of Korea Marine Corps (ROKMC) requirement for a squadron of attack helicopters. These will be operated alongside the KUH-1 utility helicopters that were ordered by the ROKMC during 2016 for delivery in 2023. The exact number of attack helicopters required was not disclosed but is rumoured to be around 20. **Robin Polderman**

Indian Dornier squadron moves home



Above: Three of INAS 310's Dornier 228s on the ramp after arriving at Porbandar. Indian Navy

INDIAN NAVAL Air Squadron (INAS) 310 'Cobras' has relocated to a new base. The unit, equipped with HAL-built Dornier 228 maritime reconnaissance aircraft, flew out of its previous base, Indian Naval Station

Hansa, Goa-Dabolim, en masse on September 29 to its new home at Indian Naval Station (INS) Sardar Patel, Porbandar.

The unit's base is one of the newest in the navy, having been commissioned on May

9, 2015. It is a forward operating base (FOB) situated in the frontline state of Gujarat, which has a lengthy coastline and borders Pakistan.

The squadron has operated the Dornier 228 since August 1991.

On October 1, 1998, the unit was officially named the 'Information Warfare Squadron' after at least one of its aircraft were equipped with an electronic surveillance measures (ESM) suite. **Dave Allport**



Travis Chuang

Taiwanese Tracker soldiers on

ELEMENTS OF the Republic of China Air Force (ROCAF) S-2T fleet, which was reportedly withdrawn following a final flight earlier this year, continue to fly. Serial 2220 took part in

a flying display during an 'open house' at Hualien Air Base in eastern Taiwan on September 23. The event commemorated the 80th anniversary of the ROCAF's establishment.

On May 18, Turbo Tracker 2214 had departed from the ROCAF's Pingtung AB for Hsinchu AB in the north for what was said to be its final flight. Previously operated by the 34th Anti-Submarine

Squadron at Pingtung, it was to be preserved at Hsinchu.

The latest information from the ROCAF suggests the S-2T will be decommissioned on December 1, to be replaced by the P-3C.

Bangladesh expands Dornier fleet

THE BANGLADESH Navy (BN) has ordered a further two Dornier 228NG Special Mission aircraft from RUAG Aviation. The deal involves two new production aircraft that will "extend the BN's reach and endurance options for search and rescue and natural disaster missions," and was announced on October 11. The BN acquired its first two Dornier 228s in July 2011. The first example arrived at Kurmitola on June 3, 2013.

RAAF Spartan at Exercise Southern Katipo

THE ROYAL Australian Air Force's (RAAF's) C-27J has taken part in its first major international exercise. No 35 Squadron from RAAF Base Richmond, New South Wales, took a single Spartan to New Zealand in October for the type's debut overseas trip in RAAF service. The airlifter provided an air mobility capability for Exercise Southern Katipo 2017, the New Zealand Defence Force's largest combined and joint exercise.

From October 18 to October 27, the RAAF Spartan transported more than 200 troops and equipment and 11,000lb of cargo into the exercise area, including personnel from Australia, French Polynesia, New Zealand, Papua New Guinea, Timor-Leste and the United States. The C-27J also conducted airdrops to resupply troops in the field.

The RAAF also deployed a King Air 250 to support Southern Katipo, while a C-130 assisted in transporting personnel from Australia to New Zealand.



Above: On October 22 this RAAF C-27J delivered troops from Timor-Leste and the US from the New Zealand city of Christchurch to RNZAF Base Woodbourne during the field training component of Exercise Southern Katipo 2017. SGT Ricky Fuller/Commonwealth of Australia

SDB II for RAAF Lightning II

THE US State Department has approved the possible Foreign Military Sale of the Raytheon GBU-53/B Small Diameter Bomb Increment II (SDB II) to Australia. The Defense Security Cooperation Agency delivered the required certification notifying Congress of this possible sale on September 29. The proposed sale of up to 3,900 SDB IIs is valued at US\$815m and the weapons will arm the Royal Australian Air Force F-35A fleet. Also included are up to 30 GBU-53/B Guided Test Vehicles (GTV) and up to 60 GBU-53/B Captive Carry Reliability Trainers (CCRT). Australia has committed to 72 F-35As for three operational squadrons and a training squadron.



Above: A ScanEagle is launched from the flight deck of HMAS 'Newcastle' in the Middle East in support of Operation Manitou. ABIS Nicolas Gonzalez/Commonwealth of Australia

Final EC135T2+ delivered for HATS

BOEING DELIVERED the last of 15 Airbus Helicopters EC135T2+ aircraft for the Helicopter Aircrew Training System (HATS) to the Australian Defence Force (ADF) in late August. The manufacturer announced the milestone on October 10.

The HATS programme will provide ab initio training to Royal Australian Navy and Australian Army

students at HMAS Albatross in Nowra.

Since being introduced to the programme, the EC135 fleet has exceeded 1,200 flying hours. Operating as 723 Squadron, HATS is due to accept the first RAN and army trainees in mid-January and will eventually train up to 130 aircrew each year including pilots, aviation warfare officers, aircrewmen and sensor operators.



Above: ADF EC135T2+ helicopters await their first trainees at the Joint Helicopter School at HMAS Albatross. CPL Mark Doran/Commonwealth of Australia.

Progress for ScanEagle and Camcopter

THE ROYAL Australian Navy (RAN) has completed operational evaluation of the Boeing Insitu ScanEagle unmanned aircraft system (UAS) and plans to begin trials of the Schiebel S-100 Camcopter.

The Adelaide-class guided-missile frigate HMAS Newcastle conducted the RAN's first simultaneous operations of manned and unmanned aircraft during its current deployment to the Middle East on Operation Manitou. In September, the warship's MH-60R

helicopter and the four embarked ScanEagles were employed on concurrent surface search taskings in the Gulf of Oman. Prior to the simultaneous manned-unmanned operation, the ScanEagle was used to conduct surface search and persistent, covert surveillance in support of maritime security operations, including chokepoint transits in the Bab al Mandeb. As of late September, the ScanEagle had flown 140 hours over 29 operational evaluation taskings.

In future the RAN will deploy its fleet of two S-100 rotary-winged UAS for evaluation with the service's Unmanned Aircraft Systems Unit (UASU). This is based within the RAN's Headquarters Fleet Air Arm at HMAS Albatross at Nowra, New South Wales. In December last year Australia signed a contract for acquisition of the two Camcopters plus three years of technical support. The two units are due to be delivered before the end of 2017.

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512/17

Iraqi L-159s in combat



“The ALCA has played a major role in defeating Daesh [so-called Islamic State, IS],” the IQAF chief, General Anwar Hamad Amin, told *AFM* at his Baghdad headquarters in late September. “They flew as part of our combat force, alongside Cessna 208 Caravans, Su-25s and F-16s, participating in combat missions all over the north and northwest of Iraq, to help liberate places like Fallujah, Ramadi, Rawa, Tal Afar, Nawija and Mosul.”

These had all fallen to the jihadis as they swept into the region in September 2014.

During *AFM*’s visit, the IQAF chief summarised the L-159’s latest mission statistics: “They have flown 418 combat sorties, dropping 859 [Mk82 500lb/227kg] bombs.” He

added: “They have made a valuable contribution, and we are grateful to Aero for handing the first jets over just 88 days after the contract became effective.”

The first three aircraft (single-seaters IQAF 5903, 5904 and 5905 and two-seater IQAF 5901) were officially handed over on September 26, 2015, and the first pair (5903 and 5904) arrived at Balad on November 5. By late February the following year, a handful of pilots had returned to Iraq from their conversion course at Aero Vodochody and began tactical training on the jets. Three months on, in late May 2016, they had completed their weapons training, and a first bombing mission took place on June 12. Two aircraft,

armed with Mk82 bombs, attacked targets near Nawija.

The chief continued: “I’m proud of the role we played working alongside the Czech Air Force and Aero. Without support and co-operation from both sides [Czech and Iraqi] we couldn’t have used the aircraft so well.”

Gen Anwar said the L-159 is set to serve the IQAF into the foreseeable future, in the same way Aero L-29s and L-39s did in the 1970s and 1980s.

“We acquired the aircraft as we saw them, because we were in desperate need of their capabilities, but in future, we would like them to be better equipped. A targeting pod is a main priority, because it means they could use laser-guided bombs and smart weapons.”

With its Grifo multimode radar,

the ALCA has considerable development potential, above and beyond the IQAF’s current close air support requirements. Aero Vodochody is exploring several upgrade options, but remains tight-lipped on details. Gen Anwar continued: “The jet has a big future with us. We chose the L-159 because we had a good experience with the L-29 and L-39 in the past and the L-159 is helping to rebuild the strong bridge that connected the Czech Republic and Iraq back then.”

AFM met several officers both at Balad – where the ALCAs are based – and the IQAF HQ in Baghdad, who had been trained at the Brno Military Academy in Czechoslovakia during the 1980s, and who still speak Czech with the

This November marks the second anniversary of the Aero Vodochody L-159 Advanced Light Combat Aircraft's (ALCA's) arrival in Iraq. Since then, the Czech-built fighter has proven its qualities to the Iraqi Air Force (IQAF) during a time of great need, as **Alan Warnes** discovers.



Above: The IQAF's first L-159 combat mission took place on June 12, 2016 when two jets each loaded with two Mk82 bombs attacked IS targets. All four weapons were delivered successfully. This jet is taxiing out for departure. Aero Vodochody

Aero Vodochody personnel.

Support effort

The IQAF can't yet fully support L-159 operations, but it does have personnel working on the flight lines. A maintenance contract with the manufacturer ensures that a small team of between eight and ten technical staff keeps the aircraft in the air.

"We will, however, see our reliance on [foreign] contract staff over the next few years decrease for all aircraft, and this will lead to our own engineers and maintenance personnel taking on more of the workload," the chief said.

The ALCA contract, which became effective on June 30, 2015, covered ten single-seaters and two dual-seaters. All the former have now been delivered

to 115 Tactical Squadron at Balad Air Base, some 50 miles (80km) north of Baghdad. The jets are equipped with four hardpoints under the wings, two that carry 350- or 500-lit (77- or 110-imp gal) fuel tanks and the other pair for weapons: either the Mk82 bomb or training weapons, such as the SUU-5003 training pod with BDU-33 practice bombs.

Last December, the IQAF took delivery of the first two-seater to be built for a foreign customer. However, the two dual-seaters remain at Aero Vodochody's Prague facility where they are being used for pilot training. They are expected to arrive in Iraq early next year. In Prague, Iraqi pilots complete a conversion course of 30-35 hours. Their previous flying experience ranges from the

US-built F-16C/D, T-6 Texan II and Cessna 208 Caravan to various Russian types and transports.

Meanwhile, at Balad AB, 115 Tactical Squadron is being coached by the Czech Air Force Air Advisory Team (AAT) Iraq while Aero Vodochody is providing technical support staff to carry out 'I'-level (second-line) maintenance. Three L-159As were undergoing this process as of late September.

Currently the ALCA is the only non-Russian aircraft being maintained, in part, by IQAF personnel, and foreign contractors are supporting all types except the An-32 and Su-25.

In September, IQAF groundcrew were busy solving minor technical problems on the flight lines. At the same time,

qualified IQAF personnel were mentoring younger technicians on all aspects of the jet. For example, an IQAF armaments specialist was showing a young NCO around the L-159's VS-2 zero-zero ejection seat, while another officer explained the avionics systems.

Air Advisory Team Iraq

The main objective of Czech Air Force AAT Iraq is to get the ALCA to full operational capability (FOC) by the end of next year.

"For us, FOC is when the aircraft can be used for training, day/night tactical ops, and exercises," the IQAF chief explained. "Our pilots are good, but they need to raise their levels, and eventually be taught by our own instructor pilots." ■



Above: This dual-seat L-159T1 is used for IQAF pilot training at Aero Vodochody in the Czech Republic. Aero Vodochody

By the time FOC is achieved the IQAF should have taken over all aspects of maintenance too. Maj 'J' from 2 Wing HQ, based at Čáslav, is the AAT's current commander.

He said: "We want to mentor them, having first forged a friendship. Then we have to evolve training and perhaps approach things differently than they would."

The major and his team had completed two months of a six-month deployment to Balad. The previous four deployments were of only four months' duration, so they now faced some fresh challenges.

Maj 'J', who is one of three Czech Air Force pilots among the 30-strong team, added: "When the Iraqi pilots return from the Czech Republic, we provide them with the tactical training they need here to get the most out of the aircraft. Our mandate is only for training missions as we are not allowed to support them during combat sorties."

The AAT began work in mid-2016 and is expected to continue until the end of next year when it completes instructor pilot training. One of the other AAT pilots, Capt 'M' came to Balad from Čáslav-based 211 Squadron, and flew in a two-ship formation with an IQAF pilot during a typical air-to-ground training mission on the first day of AFM's visit.

He said: "It's always a face-to-face briefing, with target information. Missions are usually between 50 minutes and up to an hour, based on the mission profile. We will fly in mixed formation with the Iraqi pilots whenever it is required. The US doesn't generally work that way here."

Maj 'J' added: "We are training the pilots for tactical deliveries and in the air-to-air role. We are used strictly for training and mentoring in non-combat missions. Eventually we want to help them set up their training syllabus, squadron operations and standards."

In addition to the three pilots, the Czech team includes ten mentors, who train ground personnel in the maintenance of armaments, avionics and other elements of the aircraft's systems. Several groups of Iraqi technical and maintenance personnel have been trained at Aero Vodochody up to 'O'-level (first line) status. This means they can work with line replacement units (LRUs), carry out pre-flight and post-flight checks as well as manage the aircraft monitoring system. The second-line 'I'-level work is currently being carried out by Aero Vodochody, which is deploying skilled personnel, specialising in airframe, avionics and armaments, to Balad. However, IQAF

IRAQI L-159s

Variant	Serial	Build No
L-159A	IQAF 5903	156049
L-159A	IQAF 5904	156055
L-159A	IQAF 5905	156068
L-159A	IQAF 5906	156014
L-159A	IQAF 5907	156006
L-159A	IQAF 5908	156008
L-159A	IQAF 5909	156010
L-159A	IQAF 5910	156025
L-159A	IQAF 5911	156037
L-159A	IQAF 5912	156045
* L-159s 6001, 6002 and 6004 have been used for spares		
L-159T1	IQAF 5901	156069 – fuselage built as 6075
L-159T1	IQAF 5902	156017 – fuselage built as 6084

Balad Air Base

The 115 Tactical Squadron is based at Balad AB, which housed II-76s and MiG-23s up until the Second Gulf War, at which time it was known as al-Bakr AB. After the fall of the Saddam Hussein regime in 2003, the base saw US troops move in and it was renamed Forward Operating Base Anaconda. At its height there were around 30,000 troops and contractors at the facility, which was handed back to the Iraqi authorities in 2011. Today the sprawling base is home to the new F-16C/D Block 50s serving 9 Squadron, Cessna 208s and 172s with 3 Squadron, as well as the 115 Tactical Squadron L-159s.



personnel will soon be going to Prague to learn these skills, and will ultimately take over.

Czech connection

The IQAF shares a long history with Aero, having acquired around 75 L-29s in the late 1960s and early 1970s and 86 L-39C/ZOs between 1975-85. This led to many technicians and engineers being posted to Czechoslovakia for training.

Today some of those men, now in their 50s, have taken up senior positions within the IQAF. One of them, Col 'S', heads up part of the Balad Maintenance Hangar, an old Il-76 facility shared by Orbital ATK and Aero. He has an MSc and is a fluent Czech speaker, and was trained at Brno Military Academy in Czechoslovakia in the 1980s, when Aero Vodochody was delivering L-39s to the IQAF.

Today, his young team of engineers and technicians, some of whom have recently returned from the Royal Jordanian Air Force Academy, are responsible for all the manuals and maintenance schedules in two tidy offices alongside the ejection repair shop and a classroom. It is in the classroom that the AAT mentors teach their students about the L-159's systems.

Another officer with an Aero connection is the base commander, Gen 'S', who has extensive flying experience that has spanned the L-29 and L-39 as well as the MiG-21, Su-22, Su-25, MiG-23, Cessna Caravan and

Flight to Iraq



Above: The Iraqi Air Force C-130J at Pardubice before the author's flight to Balad AB. Alan Warnes

The route to Balad began with the author travelling by bus to Pardubice Airport in the Czech Republic with Iraqi Air Force personnel. The IQAF C-130J crew had arrived two days earlier and, with all the cargo loaded onto the aircraft, was ready to return. All three of the aircrew had been trained in the UK. They explained that ten pilots had graduated from there in two classes, which ran from 2006-11 and 2007-12. They had first learnt English at York St John University, going through the RAF College Cranwell, in Lincolnshire, before entering elementary, basic and finally

multi-engine training. The latter was with No 45 (Reserve) Squadron flying Beech 200s. They returned home in 2011-12. Most joined 87 Squadron flying King Air 350ERs at Baghdad-Al Muthana before progressing to the co-located 23 Squadron and its six C-130Js.

The C-130J departed Pardubice at 18.30hrs local time. It took off heading west before circling back over the airport bound for the Middle East.

The hold was full of cargo, so finding a place to sleep meant looking for a crate to lie on. The author went up to the cockpit around 01.00hrs, and the navigator explained

the aircraft was over Erbil, the diversion airfield. The Hercules continued south and touched down at Balad AB at around 01.30hrs (local).

Security met the author and his Czech colleague as the Aero Vodochody technical staff and C-130J aircrew started to unload the Hercules. The author was provided with a flak jacket and helmet, which always had to be at hand in case of attack by IS, and was then driven to the compound for a three-day stay. He finally departed in an IQAF RC-208 Combat Caravan for Baghdad Al-Muthana, to meet the IQAF chief Gen Anwar Hamad Amin.

F-16. He is now looking forward to the arrival of the dual-seat L-159T1s so he can be checked out to fly the single-seater.

When the IQAF became the first export customer for the ALCA, Czech industry and the military

plotted a course to mature the jet. Looking to the future, while there is a clear requirement for the L-159 to receive a targeting pod, the Czech Air Force stopped short of this requirement for its aircraft in the late 1990s.

However, the manufacturer has offered the upgrade to the Czech Republic as part of a mid-life update. The IQAF could receive the pod much earlier than the Czech Air Force, under an urgent operational requirement. **AFM**



Above: Aero Vodochody is still providing technical personnel for the 'I'-level maintenance in the Balad maintenance hangar, but this will eventually be taken over by IQAF technicians. Alan Warnes

Left: Two L-159As taxi back into position after completing their training mission. Unlike all the other non-Russian aircraft operated by the IQAF, Iraqi personnel are responsible for the flight line operations. Alan Warnes

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Future imperfect?

Tim Ripley looks at the implications for the country's air arms in the run-up to the latest UK defence review.



In November 2015 the British government unveiled its Strategic Defence and Security Review (SDSR). It contained good news for UK military aviation. The Royal Air Force got back into the maritime patrol game with an order for nine P-8 Poseidons and its drone fleet was to be renewed with 20 General Atomics Protector long-range and long-endurance unmanned aerial vehicles (UAVs). Two additional Typhoon squadrons would be stood up to replace the retiring Tornado GR4s. Additional F-35B Lightning IIs were secured to fully equip the two new Queen Elizabeth-class aircraft carriers. The Army Air Corps (AAC) could look forward to a revamp with 50 new

Boeing AH-64E Apache attack helicopters.

Fast forward two years and the mood music coming out of the Ministry of Defence in London is very different. The newspapers are full of reports about £20bn "black holes" in the defence budgets. Navy ships, army helicopters and armoured vehicles are in the frame to be scrapped or sold off. Despite the bullish talk after the 2015 SDSR, the defence secretary Sir Michael Fallon was being more cautious before he dramatically resigned his post on November 1.

In July, the British government launched what it called a National Security Capability Review, to take a new look at the 2015 SDSR and to assess whether a recent spike in terrorist attacks in the UK and Western Europe, further Russian adventurism, and the outcome of the

2016 Brexit referendum required a change of policy.

AFM was at the Conservative Party Conference in Manchester in early October, to hear Fallon make a pitch for extra funding for the UK defence budget to increase its spending above the NATO 2% gross domestic product (GDP) target to meet the new security challenges. In his most detailed description of the new review process, which was launched in July, Fallon said it would be "shorter and sharper" than the 2015 defence review.

Fallon said that the UK defence budget was already protected by a "double lock"



of commitments by the Conservative government to meet the 2% GDP target and to raise defence spending by 0.5% above inflation for the duration of the current five-year parliamentary term. However, he said this might not stretch to fund his ministry properly. "Some say this is not enough," he said. "It is important to reassess if the budget is still sufficient."

Planning for the future

Mr Fallon said he wanted the new review to ensure that financing of defence was secure for the long term because it had been hit by the dramatic devaluation of the British pound since last year's Brexit referendum on membership of the European Union. "We need to put the budget on a long-term sustainable footing," he said. "The Chancellor [of the Exchequer, UK finance minister Philip Hammond] is part of this review". Fallon said it was too early to say if the Chancellor would give the Ministry of Defence more ►

Above: F-35B ZMI36 is the second production Lightning II for the UK, BK-2. It flies with No 17 (Reserve) Squadron at Edwards Air Force Base, California. Any funding cut for the Lightning Force is likely to see numbers reduced or a delay in the establishment of the first navy squadron. Jamie Hunter
Below: A pair of Tornado GR4s from one of the final squadrons – No 31 'Goldstars' at RAF Marham, Norfolk. The GR4 fleet was planned to stand down in March 2019, but the success of Operation Shader against so-called Islamic State could see that brought forward. Jamie Hunter





Above: The Chinook Force's numbers were bolstered to meet a shortfall in rotary-lift capacity during the long-running war in Afghanistan. Now the 60-strong fleet is a possible candidate for cuts in airframe numbers. Chinook HC4 ZD575 survived a Taliban attack over Helmand in May 2007. *Jamie Hunter*
Below: No 1 (Fighter) Squadron Typhoon FGR4 ZK335 'FC' carries Paveway IV guided bombs to Scotland's Cape Wrath training area. Among the boosts for the RAF in the 2015 SDSR was the promise of two new Typhoon squadrons with older Tranche 1 jets. If more cuts are made, this plan could be at risk. *Jamie Hunter*



money. "We will make that case," he said. The defence secretary hinted that numbers of platforms could be reduced in the review, which is expected to report by the end of the year. He said defence effects needed to be measured properly. "It is not just numbers – of people and ships –

but the power and effect of the assets," he said. "We are looking at all things."

Fallon identified the drop in the value of the UK's currency since the 2016 referendum and delays in finding efficiency savings as "challenges" to funding his £178bn decade-long programme to buy new equipment

for the armed forces. "Part of it is met by efficiency savings," he said. "We have to realise those efficiency savings. We are only two years into a ten-year programme. It is a bit early to declare we are not meeting it. My aim is to get there. Clearly foreign exchange is moving against us."

The MOD and the UK armed forces are looking again at their forward plans to see if they are affordable and fit for purpose in the world in 2017 and beyond.

Britain's air arms are at the heart of this process and senior staff officers are developing options to help bridge the financial gaps in the ministry's plans. Several senior military and defence industry sources have shared their thoughts with *AFM* on where the review is going.

Royal Air Force

Not surprisingly, the RAF Air Command at High Wycombe is having to look again at its plans.

• **Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) Force.** Senior RAF officers consider this an area ripe for change. Their thinking mainly revolves around the long-term future of both the E-3D Sentry AWACS early warning radar aircraft and the Sentinel R1 airborne standoff radar ground surveillance aircraft. The 1970s-era Sentry radar system has been plagued by technical problems in recent years and its mechanically rotating antenna has been overtaken by more modern electronically scanned radars. The Sentinel is already slated for retirement in 2021 due to a previous round of spending cuts. One idea is to use some of the £2bn that had previously been set aside for the Sentry upgrade to replace both the E-3D and Sentinel with a single multi-role ISTAR aircraft, along the lines of the GlobalEye being developed by Saab for the United Arab Emirates. Another option would be for the RAF to give up its sovereign AWACS capability and for the UK to buy into the NATO E-3A AWACS force, contributing

OPINION: What next for Britain's armed forces?

The current speculation about further cuts to the British armed forces is illustrative of a paralysis among decision-makers on a critical subject – what is the UK's military for?

It is a long and in many cases bloody tradition in the British military to make do with inadequate and ill-suited equipment and doctrine during the early stages of major conflicts. The difference is that whereas pre-1991 the UK always at least strove to equip its armed forces for a potential peer-adversary confrontation, and had to make do with inefficient equipment in more limited wars, today there is no clarity at a political level about whether this is the aspiration. It's important.

In simple terms, the Royal Air Force, Royal Navy and British Army are sitting at (or in many areas, below) the minimum sustainable thresholds for many high-end warfighting capabilities, and especially those that relate to contested-theatre entry by air, land and sea. This means

that as further cuts are considered by a government struggling with a weak pound and GDP growth far below that forecast in the 2015 SDSR, there is very little left which can be reduced by further 'salami slicing'. Instead, entire fleets are potentially at risk and core acquisition, modernisation and upgrade programmes, which are already long overdue, face being 'moved to the right' almost ad infinitum.

The core problem is British political ambition for the armed forces has run significantly above funding levels for more than a decade. The country needs to decide if it is serious about remaining a major expeditionary military power capable of joining the US military on 'day one' against a serious near-peer opponent, and providing a backbone for European NATO forces deterring Russia in the East. If that is the ambition then defence spending must rise, and the lie that efficiency savings and restructuring existing forces can provide the answer must be

acknowledged for what it is. Advances in efficiency have been made and that is for the good, but it is misleading to believe that they can be consistently matched year-on-year.

If, however, the UK is no longer politically willing to pay for this level of military capability then that too should be honestly and openly acknowledged, and the current defence budget channelled towards certain capabilities which the UK is particularly good at and can usefully contribute to coalitions as many other European states do already.

If the dilemma facing the government and armed services in the current capability review could be summed up in one sentence, it might well be this: 'Britain can no longer maintain its coveted US-military-at-10%-scale, full-spectrum force at 2% of GDP spending, so what now?' *Justin Bronk*

Justin Bronk is a Research Fellow in Military Sciences at the Royal United Services Institute (RUSI) in London.



people and a small annual membership fee in return for access to the NATO Airborne Early Warning Force for training and operations.

- **C-130J Hercules retirement.** The last defence review saved 14 C-130Js of No 47 Squadron from the axe, allowing these aircraft to continue to provide support to special forces operations. The on-going entry to service of the A400M Atlas puts the C-130J retirement back on the table. It seems a luxury for the RAF to continue to operate three airlifters – the A400M, C-130J and the C-17 Globemaster III.

- **Tornado GR4 early retirement.** The imminent winding down of the war against so-called Islamic State in Syria and Iraq gives the RAF the option to retire some or all of its veteran GR4s early, in 2018, releasing people to form the core of two proposed new Typhoon squadrons. This also opens the possibility of generating revenue from selling redundant airframes and the spares stockpile to Saudi Arabia. The desert kingdom has a requirement to keep its Tornado Capability Sustainment Programme (CSP) strike aircraft – which are very similar in configuration to the RAF's GR4s – until 2025. The Royal Saudi Air Force is known to have a strong

Above: A Gazelle from 4 Regiment conducts winter training in the mountainous region above Bardufoss, Norway. The Gazelle's days in British Army service are coming to an end and next year the AAC will transition to a force of Wildcats and Apaches. Crown Copyright Below: The Watchkeeper made its first flight on April 14, 2010 at Parc Aberporth in West Wales. Yet to formally enter service with the British Army, the troubled drone's days may be numbered as the RAF expands its own ISTAR drone operations. Richard Seymour/Thales



interest in gaining access to the hundreds of millions of pounds of GR4 spares.

- **Chinook HC4/5/6 support helicopters.** Much of the RAF's fleet of 60 Chinooks dates from the early 1980s and many aircraft are reported to be in poor condition, requiring expensive additional maintenance and constant spare parts. To fill this looming gap, the RAF has been pushing to buy 14 new Chinook airframes, built to MH-47G configuration. The latest round of belt-tightening puts this order in doubt and could result in the reduction in the Chinook fleet size.

- **Base closures and loss of support personnel.** These options are always on the table but the most active effort revolves around what is called the Joint Helicopter Command's basing review. Options under study include moving the Chinook Force to Boscombe Down, alongside the AAC Apache fleet, where they would be co-located with the proposed Boeing-owned training and overhaul hub. This would put RAF Benson, RAF Odiham and Aldergrove Flying Station under threat.

- **Programme delays.** This 'old chestnut' is often seen as the best way to save money. ■



Right: Saab's GlobalEye platform might be a contender to replace both the E-3D Sentry AWACS and the Sentinel R1 ground surveillance aircraft. The United Arab Emirates was the launch customer, and has ordered three GlobalEye systems for integration on Global 6000 bizjets. Saab

Delays to F-35s, P-8, Protector and the active electronically scanned array (AESA) radar upgrade to the Typhoon are all on the cards and would involve stretching out delivery schedules well into the next decade. The £5bn F-35 project is a very attractive target for money to be cut or costs spread over a longer period. Even reducing the delivery rate of F-35Bs by two or three aircraft a year would save the MOD between £300m and £500m annually.

Fleet Air Arm

The Royal Navy's aviation arm currently operates 30 Merlin HMA2 and 28 Wildcat HMA1 maritime helicopters. Early next decade the Fleet Air Arm (FAA) is expected to return to the fixed-wing fast jet business with the re-establishment of 809 Naval Air Squadron (NAS) as the senior service's contribution to the Lightning Force. The navy also has ambitions to field drones to operate from a range of its ships.

Finding economies in the FAA's aircraft and helicopter force will hit its frontline capabilities. Media reports suggest the navy could lose all its Wildcats to save money. While this cut is considered drastic, a more likely prospect is reduction of the Wildcat fleet by between five and eight airframes. These would be replaced by drone rotorcraft for use on the navy's new Type 31e frigates from 2023.

A delay in the establishment of 809 NAS is the most likely impact of any decision to slip or reduce the number of F-35Bs on order for the UK.

Army Air Corps

The British Army's aviation branch was a big winner in the 2015 defence review with the decision to buy 50 new AH-64E attack helicopters to replace the existing Apache AH1. This £2bn contract is one of the biggest-ever equipment programmes for the army and it has put great strain on its budget.

The streamlining of the AAC began two years ago in the immediate aftermath of the 2015 review. The AAC has already conceded that it will lose its manned fixed-wing surveillance aircraft – the Defenders and Islanders of 651 Squadron – to the RAF next year. These will then operate as a joint unit in the counter-terrorist role with No 13 Squadron's Shadow R1s. Also next year, the Gazelle AH1s are scheduled to go out of service, effectively reducing the AAC to operating the Wildcat and Apache. At the same time, the number of frontline squadrons planned to operate the AAC's 32 Wildcats has been cut from four to two. The two units of the former 9 Regiment AAC that were supposed to be converting to



Above: Apache AH1 ZJ203 is refuelled on the Salisbury Plain Training Area. The Army Air Corps was a major beneficiary of SDSR 2015, which set out plans to buy 50 new AH-64Es, although orders have been split into two batches of 38 and 12 and a reduction in numbers is possible. Rich Pittman **Below:** A Royal Navy Wildcat escorts HMS 'Queen Elizabeth' on her first entry to Portsmouth in August. There has been media speculation that the navy could lose its Wildcat fleet or even its last two assault ships, HMS 'Albion' and 'Bulwark' to focus on the two new carriers. Crown Copyright



the Wildcat – 669 and 672 Squadron – will not begin conversion to the new helicopters after handing in their Lynx AH9As last summer. The AAC's special forces role 657 Squadron was also axed in the same round of cuts, along with the AAC's special forces reserve unit, 655 Squadron.

For the next round of cuts this leaves the AAC with little option but to contemplate downsizing its buy of AH-64Es. It has already split the order into two batches of 38 and 12 airframes because of the availability of slots on the production line at Boeing's Mesa plant in Arizona. This gives the MOD the option of not proceeding with the final batch of 12 airframes to save money.

A more drastic cost-saving option for the army would be to cancel the troubled Watchkeeper tactical UAV, which has not yet formally entered service with the Royal Artillery. Two crashes earlier this year added

to the impression that the Watchkeeper is a deeply troubled project. The Watchkeeper was first ordered in 2004 and so many elements, particularly related to its imagery distribution networks, are now considered obsolete. The expansion of the RAF drone fleet under the Protector programme could take up much of the strain if the Watchkeeper programme is terminated.

End game

Fallon said: "no decisions have been taken yet" on the upcoming defence review. The final touches to the review will be made in late November or early December. Then more will be known about the future direction for UK military aviation. Whatever options Sir Michael's successor selects it seems more changes, upheaval and downsizing can be expected. **AFM**

Below: Too many transports? After retirement of 14 Hercules C5s was put on hold with SDSR 2015, withdrawal of at least some C-130Js could return to the agenda. This Hercules was operating from a dry lakebed in the Nevada Test and Training Range at Red Flag 17-1. CPL Brenton Kwaterski/Commonwealth of Australia



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In the footsteps of heroes

Falcon Leap, an international paratrooper exercise organised by the Royal Netherlands Army's 11 Air Mobile Brigade, has its roots in the commemoration of WW2's Operation Market Garden. **Manolito Jaarsma** reports.

The sole air assault brigade in the Koninklijke Landmacht (Royal Netherlands Army, RNLA) order of battle, 11 Luchtmobiele Brigade (11LMB) is a light infantry unit composed of three infantry battalions, one reconnaissance squadron and five support companies.

As the RNLA co-operates closely with the German Army, some of its units fall under the Bundeswehr command structure – and the 2,000 personnel of 11LMB have been part of Germany's elite Division

Schnelle Kräfte (DSK, Rapid Forces Division) since 2014.

The Dutch brigade also works closely with Koninklijke Luchtmacht (Royal Netherlands Air Force, RNLAF) squadrons, coming together to form 11 Air Manoeuvre Brigade (11AMB). This consists of 11LMB and the Defence Helicopter Command's 298 Squadron (CH-47D/F), 300 Squadron (AS532U2 Cougar) and 301 Squadron (AH-64D) – all based at Gilze-Rijen – partnered with 336 Squadron (C-130H/H-30) at Eindhoven.



C-130J-30 14-5802 of the 62nd Airlift Squadron, part of the 314th Airlift Wing at Little Rock Air Force Base, Arkansas. All photos Manolito Jaarsma

Market Garden connection

Falcon Leap originates from the annual commemoration of September 1944's Operation Market Garden, which features jumps by paratroopers on the third Saturday of September every year.

Until 2014, paratroopers from the Netherlands, Poland, the UK, US and other NATO countries re-enacted these famous jumps, and with all these troops flying in to the Netherlands for one day of jumps, the commander of 11LMB decided to organise a three-day

exercise in the preceding days.

First staged in 2015, Falcon Leap gives airborne units the chance to meet, exchange knowledge and increase interoperability through cross-training. Three missions are planned each day and, depending on the available aircraft, between 600 and 700 paratroopers can be dropped in total.



Paratroopers arrive on the Ginkelse Heide drop zone during a mission on September 14. This year's Falcon Leap made exclusive use of 'round' parachutes and static line deliveries.



Cougar S-458 demonstrates operations with an underslung load at Ginkelse Heide. The RNLAf AS532U2s of 300 Squadron remain an integral part of the Dutch 11 Air Manoeuvre Brigade.

Mission planning

The mission planning begins 24 hours prior to the jump day. At Eindhoven Air Base a 336 Squadron pilot is assigned as mission commander for the aircraft formation while the paratroopers prepare at their barracks at Schaarsbergen and De Harskamp.

This year, all jumps were conducted with 'round' parachutes of the type used in the Second World War, and not the 'square' military free-fall (MFF) type used by special forces and pathfinders.

The jumps were made from low altitudes to deploy a large force quickly. While MFF jumps use the rear ramp, jumps with the 'rounds' are conducted from the aircraft's side doors using static lines.

The mission commander plans the aircraft formation depending on aircraft altitude performance and aircrew and paratrooper experience. The Luftwaffe Transalls were allocated the last positions in the formation, as they need to drop their troops from a higher altitude than the Hercules.

On the ground, planners check the certifications of the jumpmasters and their dispatchers, and the parachute limitations. The 'chutes are limited to a maximum wind speed and the jumpmasters restricted to a set number of paratroopers that can jump from a single aircraft.

The planning team assigns the paratroopers individual three-digit numbers that identify the wave, flight and sortie. A jumpmaster is responsible for a single 'chalk', or group of paratroopers, each of which is assigned to an aircraft in two 'sticks' (left and right).

Pre-jump training is conducted

at the De Harskamp barracks where all the international paratroopers are housed. The next day they are moved by bus to Eindhoven and processed to their assigned aircraft.

In one example of jump planning, Dutch paratroopers using German parachutes were assigned to a German jumpmaster team. Since the jumpmaster was limited to dropping 40 (including themselves) they were appropriately assigned to a Polish Air Force C295M transport, with accommodation for around 48.

Once the paratroopers make the jump using a 'chute from another country they will earn that nation's 'wings'. However, a certain number of jumps need to be made each year, according to national rules, for the certification to remain valid.

Drop zones

Falcon Leap uses two drop zones in the Veluwe region: Ginkelse Heide and Houtdorperveld.

Twelve missions were planned between September 13 and 16, half of which were executed – cancellations resulted from weather conditions exceeding

the limitations for safe air operations and paratroop drops.

After a jump at Ginkelse Heide on September 13, the paratroopers conducted a march that followed the route taken to Arnhem by the British Army's Col John Frost in September 1944.

The RNLAf had two Hercules aircraft assigned to the exercise. However, due to Hurricane *Irma*, they were re-tasked and flown to Curaçao to provide humanitarian relief. Meanwhile, due to other commitments, the Royal Air Force had to cancel its annual participation in the jumps.

Two public events were planned to mark 11LMB's 25th anniversary this year, although a joint demonstration with the RNLAf helicopter squadrons planned for September 13 had to be cancelled due to poor weather.

The next day an Apache and Cougar were able to execute their planned demonstration – the first helicopter securing the display area before the Cougar flew in an underslung load.

A Chinook flew another demonstration with a dual underslung load during the Market Garden commemoration on the 16th. **AFM**

Acknowledgements: Thanks to Major Igor and to Alex of the 11LMB communications and media department for their assistance.

Falcon Leap 2017 participants

Country	Aircraft	Unit	Drop altitude	Paratroopers	Para unit
Belgium					Dispatchers only
France					unknown
Germany	2 x C-160D	Lufttransportgeschwader 63	1,300ft	60-70	DSK
Netherlands	2 x C-130H	336 Squadron	1,000ft	60	11LMB
Poland	1 x C295M	13. Eskadra Lotnictwa Transportowego	1,000ft	40	6. Brygada Powietrznodesantowa
UK	(1 x C-130 cancelled)				4 PARA
US	1 x C-130J-30	62nd Airlift Squadron	1,000ft	60	173rd Airborne Brigade

European Maritime

P-3B 152744 during an engine test at Elefsis prior to making the flight to Tanagra for upgrade by HAI. Mike Green



 Greece

Orion's new Greek odyssey

By 1990, the Hellenic Air Force's (HAF's) fleet of Grumman HU-16 Albatrosses was obsolete. The US government initially offered to replace them with six P-3As as part of a co-operative defence agreement but, after much deliberation, Greece eventually ordered six ex-US Navy P-3Bs and four P-3As that had been stored at the US Air Force's Aerospace Maintenance and Regeneration Center (AMARC); the A-models were used for spares and maintenance training only.

Prior to delivery, the P-3Bs were restored to flying condition at AMARC and then flown to Waco, Texas, where Raytheon E-Systems overhauled them. The company was responsible

for maintenance work, interior refurbishment and repainting.

A first P-3A was delivered to the Hellenic Aerospace Industry (HAI) facility at Tanagra in May 1995, enabling maintenance crews to train on the aircraft.

Following delivery of the first P-3B in May 1996, the aircraft entered service the following month with 353 Mira Naftikis Aeroporikis Sinergias (353 MNAS, 353 Naval Co-operation Squadron) at Elefsis.

The P-3Bs are unique in the Greek inventory as they are owned and maintained by the Hellenic Navy, but their flight crew is made up of air force personnel (pilots, flight engineer and navigator) combined with a naval mission crew.

Following their introduction to service, the first overseas deployment by 353 Mira saw a single-aircraft detachment to Naval Air Station (NAS) Sigonella, Sicily, in support of NATO's Dogfish anti-submarine warfare (ASW) exercise in February 1997.

As the Orions approached the end of their service life in 2009, Greece's economic situation meant there was no budget available for a service life extension and upgrade programme, and the aircraft were withdrawn from duty. The last P-3 mission flew in support of NATO's Exercise Active Endeavour on September 22, 2009, and 353 MNAS disbanded the following month.

The aircraft then languished

in open storage at Tanagra and Elefsis air bases, but in February 2016 Lockheed Martin was awarded a \$141.9m contract to modernise a portion of the fleet. The seven-year deal initially provides for the reactivation of one P-3B and the procurement of software and hardware kits for the upgrade of four aircraft.

The mid-life upgrade (MLU) programme will give each aircraft a service life extension of 15,000 flight hours and also provides for programmed depot maintenance (PDM) and an indigenous tactical mission integration and management system – plus new avionics and other ancillary hardware.

The Greek government hopes the upgrade will give the fleet

ne Patrol Aircraft



Above: The arrival of 152744 at Tanagra in July last year. Once installed, the new M2IMS system will make the Hellenic P-3s among the most modern and capable Orions in service anywhere in the world. Mike Green



Above: P-3B 152744 taxis out at Elefsis for the short flight to Tanagra. These aircraft had been left in open storage at the base after 353 MNAS disbanded in October 2009. Mike Green

at least a further 20 years of service. The total cost of the programme is estimated at €500m and work is being undertaken at HAI in Greece as well as in Marietta, Georgia; Greenville, South Carolina; and Baltimore, Maryland.

Following contract signature, two of the P-3Bs at Elefsis began to undergo required maintenance to make them sufficiently airworthy for the short 'hop' to HAI's facilities at Tanagra. Flown by Lockheed Martin pilots, the first departed Elefsis on July 13, 2016 followed by the second just a few days later. The aircraft involved were 152744 and 153441.

Following delivery to Tanagra, a ceremony at HAI on July 25 officially confirmed the upgrade programme had begun.

Greece has selected the indigenous Maritime Mission Integration and Management System (M2IMS) as the aircraft's new tactical mission suite.

Manufactured by Interoperability Systems International (ISI-Hellas), it's designed for maritime patrol aircraft (MPAs) and built with state-of-the-art technology, with a modular design to interface with a variety of sensors for enhanced situational awareness.

M2IMS will support maritime surveillance, anti-submarine warfare (ASuW), border control, search and rescue (SAR), fisheries control and anti-smuggling missions. Information from the sensors and sub-systems is integrated to create a common operational picture for the tactical co-ordinator, mission commander, mission system operators and pilot, assisting them in their surveillance, identification and command and control (C2) tasks. The system is designed for a mission endurance of ten hours.

In February it was announced that the first two Greek pilots would start their training

programme in the US as test pilots/instructors. One was previously a P-3 captain, and it's thought the other has experience on the aircraft too.

Their initial training began in San Antonio, Texas, before moving on to NAS Jacksonville, Florida. After seven months, the pilots were expected to return to Greece in September, following which 353 MNAS will re-form at Elefsis as part of 112 Combat Wing.

With a continuing flow of migrants from Syria, Iraq and Afghanistan into Greece, the P-3Bs will also be used to

monitor the narrow crossing between Turkey and the Greek islands in the Aegean. The radar network on some of these islands has limited range and, combined with periodic technical problems, is often unable to detect people traffickers' vessels.

The Orions' long range and extended loiter capability will help Greece to monitor the situation far more effectively than at present. Their reintroduction will also assist the Greeks to conduct patrol missions over the Aphrodite gas field off the coast of Cyprus. **Mike Green** ■

ORBAT

Unit	Aircraft	Base
353 MNAS	P-3B	Elefsis

Inventory

Aircraft	Number	Remarks
P-3C	0	Four will be returned to service



Aircraft 252 was expected to pass the 20,000 flying hours mark in October. Sister aircraft 253 exceeded the figure in May, and has more flying hours than any other CN235 worldwide.

Frank Grealish

Ireland

Eyes over the sea

Responsibility for patrolling Ireland's Exclusive Economic Zone (EEZ) – an area of around 132,000 square nautical miles, or 16% of the total EU sea fisheries – falls to a pair of CN235-100MPA aircraft, operated by 101 Squadron, 1 Operations Wing, Irish Air Corps.

Flying from Casement Aerodrome, Baldonnel, on the southwest outskirts of Dublin, the squadron, whose motto is *Shúile Thar an Fharraige* (Gaelic for 'Eyes Over the Sea'), flew 301 maritime patrol missions last year.

The aircraft, serials 252 and 253, entered service in December 1994, and are the hardest working

CN235s within the worldwide Airbus Military fleet.

While Ireland's CN235 fleet can be used for tasks as diverse as paratrooping, long-distance resupply, air ambulance and transport, the main duties are maritime patrol of the EEZ and maritime SAR. For the SAR mission, the aircraft uses its sensors to search for vessels in distress, and survivors, and it can airdrop life rafts from the rear ramp when flying at low level.

In 2007-8, the systems of both aircraft were upgraded with the EADS CASA (now Airbus Military) Fully Integrated Tactical System (FITS).

This consisted of multiple systems updates, including

ORBAT

Unit	Aircraft	Base
101 Squadron	CN235-100MPA	Baldonnel

Inventory

Aircraft	Number
CN235-100MPA	2

the Telephonics APS-143C(V)3 OceanEye radar, FLIR Systems Star SAFIRE III five-axis gyro-stabilised electro-optical turret, Collins HF-9000 high-frequency radio, Honeywell inertial navigation system/GPS and RF Española's TX-ARQ satellite communications (SATCOM)/HF data link.

As supplied to the Irish Air Corps, the Star SAFIRE III includes a thermal imaging camera, a low-light level TV camera (LLLTV) and a long-range spotter scope TV camera that can be used for discreet surveillance. It's fully integrated with the FITS data management system, which allows for video and stills to be transmitted via the data link.

The duration of a typical maritime patrol mission is about six hours, and the patrol zones are as directed by the Irish Fisheries Monitoring Centre (FMC); a patrol can reach as far as 25° west if required.

A patrol crew consists of six personnel: two pilots, two

sensor and radar operators (SAROs), a radio operator and a photographer. A typical mission involves a high-level transit to the designated area off the coast, followed by a descent to lower levels to begin the patrol.

The CN235 carries out monitoring of all ships equipped with a Vessel Monitoring System (VMS) operating in the Irish EEZ, as well as surveillance of unidentified and suspicious vessels.

Targets can be identified initially using the onboard radar, and then visually using the SAFIRE cameras in the nose. Target information can also be passed to and from any Irish Naval Service ships operating in the area, as well as being shared with the FMC.

Once a vessel of interest has been identified, the CN235 will conduct a low-level pass to take photographs, with GPS location data being embedded in the images for use as evidence in any court proceedings that may result. **Frank Grealish**



The CN235-100MPA has a maximum endurance of about 9hrs 30mins, making it an ideal platform for surveillance and SAR over the Atlantic. *Frank Grealish*

All change for the Aeronautica Militare

Italy's air force and navy have traditionally jointly handled the military maritime patrol mission. The Aeronautica Militare (AM, Italian Air Force) owns the aircraft and operates them within its structure, while the Marina Militare (MMI, Italian Navy) is responsible for their operational use. Aircrew – pilots included – are provided by both services.

The end is fast approaching for the Breguet Atlantic, designated P-1150A in the Italian military design series. Capable of maritime patrol and ASW missions, the type was selected in 1968 to replace the S-2F Tracker – Italy purchasing 18, the first of which was delivered in Toulouse on June 27, 1972.

Two wings operated the type: 30° Stormo at Cagliari (Sardinia) and 41° Stormo at Sigonella (Sicily). In 2002 the 30° Stormo was disbanded, and all remaining aircraft were concentrated

with the 88° Gruppo (88th Squadron) of 41° Stormo.

Between 1987 and 1997 the Atlantic fleet was upgraded under the Aggiornamento Limitato Componente Operativa (ALCO, limited update of operational equipment) programme which added new inertial navigation system, Iguane radar, acoustic sensors, identification friend or foe (IFF) and electronic support measures (ESM).

With an airframe life of 10,000 flying hours, the Atlantic was to be phased out between 1995 and 1998, but the final retirement date was constantly moved back.

As of 2003 it was expected to be replaced by the P-8 Poseidon between 2006 and 2008, but budget cuts and a reduced focus on the MPA/ASW mission forced the AM to extend the type's operational life to 15,000 hours. Meanwhile a first Atlantic retired in 2004 and 11 had been grounded by 2011.

To maintain a minimum capability, at least in the MPA mission, in 2007 the AM began to look seriously at the ATR 72MP as a possible replacement, and the following year an order for four was signed with Alenia, with deliveries then expected in 2013-14. But development took longer than anticipated, and the final version of the contract was not signed until 2014.

The type is designated P-72A by the AM. It's based on the ATR 72ASW, a development

of the ATR 72-600 airliner for the Turkish Navy, with various modifications to transform it into a multirole surveillance and patrol aircraft.

The P-72's mission suite is centred on a Leonardo Airborne Tactical Observation and Surveillance (ATOS) system, which integrates a FLIR Systems Star SAFIRE high-definition sensor; a Leonardo Seaspray 7300 active electronically scanned array (AESA) radar; and an Elettronica ELT/800(V)2

Aeronautica Militare ORBAT

Unit	Aircraft	Base
41° Stormo	P-1150A, P-72A	Sigonella

Inventory

Aircraft	Number	Remarks
P-1150A	1	To be retired November 22, 2017
P-72A	2	Third aircraft to have been delivered early November

One of the last of 41° Stormo's P-1150As at Sigonella. A retirement ceremony for the Atlantic, and the formal introduction of the new P-72A, took place at the base on September 21.
Riccardo Niccoli



Among the Italian Air Force's first P-72As is MM62298 '41-03' (c/n 1045), one of two delivered to 41° Stormo in November last year.
Leonardo



Guardia Costiera ORBAT

Unit	Aircraft	Base
2° Nucleo Aereo	ATR 42MP, P.180	Catania
3° Nucleo Aereo	ATR 42MP, P.166-DL3	Pescara

Inventory

Aircraft	Number
ATR 42MP	3
P.166-DL3	3
P.180	1

ESM/electronic intelligence and self-defence suite that includes laser and radar warners plus chaff and flare dispensers.

The aircraft has a glass cockpit, Link 11 and 16 data links and Ku/Ka-band SATCOM. No weapons are currently included, but they could be integrated in the future.

In July 2014 the first P-72A (CSX62279) arrived at Caselle from the Naples-Capodichino plant in 'green' configuration. Its maiden flight in full MPA configuration took place on April 1, 2016 and the first two aircraft were delivered to the AM at Sigonella on November 25 that year.

The remaining two were expected to arrive this year. At the time of writing, the last Atlantic is soldiering on while waiting for the P-72A to achieve initial operational capability, but it was due to be retired on November 22.

Guardia Costiera

Italy's Guardia Costiera (Coast Guard) is responsible for maritime SAR and anti-pollution surveillance. Its first aircraft was the Piaggio P.166-DL3 SEM (Sorveglianza Ecologica e Marittima, ecological and maritime surveillance), with a mission suite including a radar, forward-looking infrared (FLIR) and TV camera.

Four were introduced to service with the 1° Nucleo Aereo (1st Air

Section) at Sarzana from August 1988, followed by eight more, with deliveries ending in 1990. Two more DL3s were received in a utility configuration.

In 2007 the type began to retire, and today only three remain in service – two equipped with a new anti-pollution system.

To expand its capabilities, the Guardia Costiera selected a new aircraft, the ATR 42MP (Maritime Patrol), already in service with the Guardia di Finanza (see



Coast Guard P.166-DL3 SEM MM25165 '8-07' has been retired and is displayed at the Volandia aviation museum near Malpensa Airport. The fleet still includes three of the type. Riccardo Niccoli

below). This type was derived from the ATR 42-400 series and included a first version of the ATOS system, integrated with ESM and FLIR systems.

The first of three aircraft was delivered in May 2001 to the 3° Nucleo Aereo at Pescara, while the second and the third – based on the ATR 42-500 – were introduced to service in July 2004 and February 2010 respectively, assigned to the 3° Nucleo Aereo at Pescara and the 2° Nucleo Aereo at Catania.

In March 2011 the Guardia Costiera took on a Piaggio P.180. Although intended mainly for transport and liaison duties, it's also equipped with a FLIR/TV payload and can conduct surveillance and patrol missions.

Guardia di Finanza

In the late 1980s the Servizio Aereo della Guardia di Finanza (GdF, Customs Police Air Service) wanted to increase its 'bluewater' capability by acquiring fixed-wing aircraft, and

in 1990 introduced the first of 12 P.166-DL3s. The initial two were the utility version and the remainder in SEM configuration.

They were assigned to the Gruppo Esplorazione Aeromarittima (GEA, Air and Naval Scout Group) based at Pratica di Mare.

Between 1998 and 2004 an improved version was introduced, the P.166-DP1, which features new engines,

fuel system and avionics; six aircraft were gradually modified to this configuration.

In the early 1990s the GdF decided to introduce a new platform for longer-range surveillance missions, including combating illegal maritime traffic across the Mediterranean. It selected the ATR 42MP, which had the same mission suite as that later adopted by the Guardia Costiera.

The first aircraft, delivered in 1995 in a cargo configuration, was mainly used to train aircrews. The second, which took its maiden flight in February 1999, had its full mission suite installed, and similar equipment was then retrofitted to the first aircraft.

The third and fourth (based on the ATR 42-500) were delivered in October 2007 and November 2008 respectively.

The four are controlled by the GEA and, with an eight-hour endurance, can operate throughout the Mediterranean. Sometimes they operate as far afield as the Atlantic Ocean, off the coast of Africa, to counter illegal traffic at its origin in co-operation with foreign police forces.

Since the early 2000s all Italian MPAs have been used to monitor immigration routes passing through the Balkans and from Africa. Aircraft of all three services operate from their home bases at Pratica di Mare, Sigonella and Catania and are also deployed to the island of Lampedusa.

In February 2007 the GdF took on two P.180s, also assigned to the GEA. They're used for various missions, but can be equipped with a FLIR/TV payload for MPA work. **Riccardo Niccoli** **AFM**



The Guardia di Finanza's MPA fleet is spearheaded by the ATR 42MP. This is MM62166 'GF-14', one of the first two delivered, both of which are 400 series aircraft. Leonardo

Guardia di Finanza ORBAT

Unit	Aircraft	Base
GEA	ATR 42MP, P.166-DP1/DL3, P.180	Pratica di Mare

Inventory

Aircraft	Number
ATR 42MP	4
P.166-DL3	6
P.180	2

Guardia di Finanza P.180 MM62248 'GF-18' at Pratica di Mare. The Gruppo Esplorazione Aeromarittima uses it for a range of tasks. Riccardo Niccoli





Dolomites helo rescue

Personnel from armed forces and government agencies attended the tenth Grifone exercise – held in Dobbiaco in the Dolomites from September 4-8 – in order to acquire new skills and share experiences of mountain search and rescue. **Alberto Celsan** and **Marco Bazzan** investigate.



Above: The winch operator signals from the cabin door of a Polizia di Stato AB212 as it descends into a forest clearing. Serial MM81653 is a demilitarised aircraft now assigned to 2° Reparto Volo at Milan-Malpensa as 'PS-94'.

An Italian Air Force Grob glider is training over South Tirol with an instructor and student on board. Suddenly, communications with the crew are lost. The last visual contact is reported by another glider flying nearby. The detachment chief at Dobbiaco Airport reports the emergency to the military in Padova. After a few minutes, the police are informed by a group of mountain-bikers that a glider entered a cloud and failed to emerge, while the local mountain rescue centre receives an alert from a tourist group who noticed a glider suddenly disappear while performing risky manoeuvres. The incident is confirmed to law enforcement authorities by a man who saw a glider losing its tail and two parachutes opening.

Sergeant Enrico G, one of the 'survivors', explains: "The glider has crashed in a mountainous area and I managed to escape. No emergency electronic devices are on board, so they don't know my position. I have an injured shoulder but my instructor is

Above: A rescuer prepares to be winched down from Italian Air Force HH-139A MM81796 '15-40' against the spectacular backdrop of the Dolomites. The helicopter is operated by 81° Centro Addestramento Equipaggi at Cervia, as part of 15° Stormo.

All photos Alberto Celsan and Marco Bazzan

badly hurt. Fortunately, today we are only simulating the accident."

What could be a real incident is, in fact, the second mission planned for the Grifone exercise. This is Italy's main aerial search and rescue training event, organised by the Aeronautica Militare (AM, Italian Air Force).

Grifone is held annually at different locations in Italy. It gives participants the chance to familiarise themselves with local rescue services and expand their knowledge of different territory.

High-altitude work

"This year's scenario is very instructive because helicopters suffer at high altitude due to power problems and behave differently: the controls respond slower because of air density. Whatever manoeuvre you do, you must execute it much earlier," explains Captain Andrea T, an AM HH-139A pilot.

"[The helicopter] needs more time and more power to stop in the hover, the margin of error is very small. Wind is another

determining factor: if known and constant it helps you, but if it's unknown and suddenly appears it's a problem," Capt Andrea T continues. "A breeze is actually better than no wind, because it gives a bit of extra power as the rotor creates more lift. Teamwork is all when flying in a mountainous environment. The pilot has to focus on flight safety, looking outside to find any obstacles, such as unmarked cables. The other crew are in charge of the search. Night flying is very challenging. Night-vision goggles are useful but limit the visual range somewhat – you have to continuously move your head – and they give a different perception of the depth of field. The crew have to update each other constantly."

The exercise comprised two main events. Day one simulated the crash of an AM C-27J involved in paratropping, while day two featured the incident with the glider.

In total, 460 men and women completed 28 interventions during 95 sorties and over 50 flight hours.

Sgt Enrico G explains: "To ensure a realistic scenario, each event develops according to a storyline designed to provide rescuers with the initial information to identify the crash scene. Survivors are air force and army personnel. The exact rescue point is unknown, even to the survivors, until the last minute. Today the organisers have decided to make things complicated, choosing a location that is very difficult to spot, near a small field surrounded by tall trees.

"If an incident like this really happens, first you try to contact the crews' personal cell phones. If you get a missed call, the next step is asking the phone companies to check which antennas registered the last contact, to get an initial position of the missing men. Integrating this data with any more evidence we get provides the starting point co-ordinates."

Team effort

Managing all the data and resources is GRIFOSAR, the co-ordination centre based at Dobbiaco. Once the co-ordinates have been set, it sends orders to the available units, this year consisting of 11 helicopters and 24 ground rescue teams belonging to, among others, the AM, Armée



de l'Air (French Air Force), Esercito Italiano (Italian Army), Carabinieri, Guardia di Finanza, Polizia, Vigili del Fuoco (Firefighters Corps), National Alpine Cliff and Cave Rescue Corps (CNSAS), Mountain Rescue Service of the South Tyrol Alpine Association (AVS) and Protezione Civile (Civil Protection).

The first to take off are fixed-wing AM U-208A (SIAI S.208) and Polizia P68 aircraft tasked with searching along the perimeter of the crash zone.

Once the wreck is located it's time for the helicopters to bring the rescue teams to the site. GRIFOSAR assigns each available helicopter a specific search area

for a detailed reconnaissance, flying at low altitude. The wreck is positioned near a couple of glades, one of which can accept a helicopter. Within minutes, a Vigili del Fuoco AB412 and a Polizia AB212 land the CNSAS and AVS units, which start to search for the missing crews.

One of the pilots is found near the glider. Due to his condition, a medic is requested, who arrives in an AM HH-139A.

"Based on the information received in flight, we planned to land the medic in a small glade nearby, join the ground team and move the wounded person to a more accessible area,"



Above: Italian Army participants included AB205A-1 MM80552 'E.I.300' from 34° Gruppo Squadroni Toro', part of the 4° Reggimento Aviazione dell'Esercito 'Altair' based at Venaria Reale in Turin.

Above: The scene at Dobbiaco reveals the diversity of different Italian helicopter operators involved in the exercise. In the foreground is 'Alpinised' Guardia di Finanza AB412HP MM81504 'GF-216' from the local Sezione Aerea Bolzano (Air Section Bolzano), while Vigili del Fuoco AB412EP I-VFPA 'VF-71' finds a parking spot. **Left:** One of two French Air Force AS555AN Fennecs involved in the exercise, serial 5382 'UV' from Escadron d'Hélicoptères 5/67 'Alpilles' manoeuvres carefully between trees. This unit is based at Base Aérienne 115 Orange-Caritat.

explains Captain Andrea T. "But radio contact with the people on the ground failed and we had to work to verify that the glade was the correct one, establish if a landing was possible and work out the routes taken by the teams already on the ground."

Communication between the units was entrusted to GRIFOSAR, which promptly provided the new frequency and radio codes. "Once back in radio contact, we were informed the injured man couldn't walk, having suffered a head trauma, so we chose a hoist recovery. The area was very narrow – we were hovering at 40m above the treetops. Hovering for a long time requires a lot of power and it's usually better to land if possible."

Using the hoist is a delicate manoeuvre that can create problems when personnel from different units are working with unfamiliar helicopters. Incorrect positioning of the rescuer on the hoist can cause autorotation in the uplift from the rotors.

"The HH-139 has a powerful engine and generates a lot of airflow. It's very important that personnel from other units train to operate different helicopters to understand their behaviour and maintain the correct position with the hoist."

Once the mission was completed, the ground teams were recovered and brought back to the base by Vigili del Fuoco, Polizia and Armée de l'Air helicopters. **AFM**

PLAAF IN



Besides territorial defence, the top priority of the People's Liberation Army's (PLA's) modernisation is the still-open issue of Taiwan. This is clearly indicated by the official order of protocol for the new Theatre Commands, which lists the responsible Eastern Theatre Command first; and is repeatedly mentioned in official publications, including the recently published *Chinese Military Strategy*.

But it's not only Taiwan that poses a challenge to the PLAAF – there are also long-standing disputes with India in the west and Japan in the northeast. Meanwhile, internal unrest remains a threat, there's the difficult situation with North Korea and there are tensions around the South China Sea.

China's neighbours are usually grouped within Northern Asia (including Mongolia and Russia), the Far East (Japan, the Koreans and Taiwan), Southeast Asia



(Indonesia, Laos, the Philippines and Vietnam), South Asia (Afghanistan, Bhutan, India, Myanmar, Nepal and Pakistan) and Central Asia (Kazakhstan, Kyrgyzstan and Tajikistan).

The PLA, however, assigns responsibilities for these areas in an entirely different fashion. For example, the borders with Mongolia and Russia are assigned to the Northern Theatre Command – together with the Central Theatre Command – which is also responsible for the area facing the Korean peninsula and Japan. Otherwise, responsibility for

the borders in the complete southern and western sectors – including all Southwest Asian countries and those within the Himalayas plus the former Soviet Republics – falls to the Western Theatre Command.

This review of the PLAAF's current structure and operational units follows the PLA's order of protocol and may at first sight seem unusual to the average Western observer. Following the PLA structure, however, makes for a clearer understanding of the corresponding ORBATs.

Bases and brigades

The PLAAF revealed its last major unit reorganisation in 2012, which included the introduction of bases and brigades. According to the limited information available, this new organisation was initiated the previous year.

Now, after around six years' experience with the four

established bases and their subordinated brigades (which replaced the former system of divisions and subordinated regiments), the PLAAF is rapidly progressing with a much larger reorganisation that began early this year.

Almost every week a new brigade is confirmed, aircraft are renumbered and reports appear about newly established bases. At the same time, older divisions are restructured or disbanded and their former regiments are either converted to brigades or, especially if equipped with obsolescent aircraft, disbanded.

After several months observing these changes, the picture is slightly clearer: it seems the PLAAF has not only expanded the base/brigade concept and adopted it for all Theatre Commands, but this reorganisation is much more profound than the 2012 reform.

The PLAAF has apparently adopted this new organisation

NDETAIL

AFM continues its Force Report on the People's Liberation Army Air Force (PLAAF), with **Andreas Rupprecht** assessing its latest structure and providing an up-to-date order of battle for its frontline units.



for its tactical combat units. For the strategic assets – bomber, transport and specialised units – it seems the divisions and regiments will survive.

There are also indications that the People's Liberation Army Naval Air Force (PLANAF) has begun a similar restructuring.

There are still many uncertainties, especially concerning which base each brigade is subordinated to. Consequently, this ORBAT is an attempt to describe the current situation.

It's important to note the difference between an 'air base' and a 'base'. The former is simply an operations centre for units of an air force, on ►

The four PLAAF bases created in January 2012

Dalian Base	空军大连基地
Nanning Base	空军南宁基地
Shanghai Base	空军上海基地
Urumqi Base	空军乌鲁木齐基地



Above: J-7E 69171 of the 86th Air Brigade at Rugao, which is part of the new-look Shanghai Base. The main role of the parent Eastern Theatre Command is air defence of the eastern provinces and the city of Shanghai. Top: Missile-carrying H-6K serial 11098 from the 8th Bomber Division of Southern Theatre Command seen during Airshow China at Zhuhai. These aircraft can project power over the South China Sea, supported by tankers and 'Flanker' escort fighters. Insert: The official air force flag of the People's Republic of China. All photos via Chinese internet



Above: Seen firing unguided rockets during a ground-attack exercise, J-10A 74110 is part of the 130th Air Brigade based at Mengzi. The parent Nanning Base was created in 2012 as part of Southern Theatre Command.

which a certain unit is housed.

A base, however, is a 'leader grade' organisation. Although at first sight it looks as if regiments were replaced by brigades (usually reusing their original numbers), and divisions replaced by bases, the main difference relates to its leader grade.

Each base is directly subordinate to the relevant Theatre Command Air Force HQ – which is a Theatre Command deputy leader grade organisation. As such, each of the bases has command over all PLAAF air brigades (division deputy leader grade), air defence and radar units in the immediate area of responsibility.

Historically, most bases were former Military Region command posts. Now, there are usually two bases within each Theatre Command, responsible for commanding the individual brigades within the five formal Theatre Air Forces. Each of these 'command' bases also has associated, specific forward operating air bases.

Besides the bases and their 'regular' brigades, several additional 'specialised' brigades formed between 2012 and 2017, most often simply by upgrading an existing regiment.

As a result, there are different types of air brigades:

* Training Brigades.

Subordinate to the PLAAF's Flight Instructor Training Base (= former Flight Colleges), directly subordinate to Theatre Command Air Force HQ;

* Special Function Brigades.

For example, the brigades subordinate to the Flight Test and Training Centre (FTTC), the Tactical Training Centre (TTC) or the 15th Airborne Corps,

UAV brigades, and dedicated transport/liaison/search and rescue (SAR) brigades which operate as independent units.

Unanswered questions

Until now it's not been fully understood *why* these changes have been made. Most probably a key driver is to enhance operational capabilities by 'cleaning up' the command structure and improving interoperability between the PLAAF and PLANAF.

On the other hand, it appears the PLANAF is converting entirely to the base/brigade system, while the PLAAF has so far only addressed tactical units.

It's also unclear what implications the reorganisation will have on the overall number of operational types, because a typical fighter/attack regiment has 24 aircraft while a brigade can have up

Summary – PLAAF Bases

Theatre Command	Former MR/MRAF	Command Posts		Confirmed bases (up to October 2017)
		Corps Deputy Leader	Division Leader	
Eastern	Nanjing	Fuzhou	Shanghai Zhangzhou	Shanghai Fuzhou
Southern	Guangzhou	Wuhan	Nanning	Nanning Kunming
Western	Chengdu	Kunming	Lhasa	Urumqi
	Lanzhou	Urumqi (Wulumuqi) Xi'an	Hetian	Lanzhou Lhasa
Northern	Jinan	-	-	Dalian Jinan
	Shenyang	Dalian	Changchun	
Central	Beijing	Datong	-	Wuhan Datong

to 40 – although, in the latest round of reforms, the number of aircraft has not changed.

Moreover, because the reorganisation is ongoing, it's not clear whether the PLAAF will indeed abandon all tactical divisions – nor which aircraft types will suffer under the cuts implemented.

The first victim seems to be the Q-5 – apparently they've all now

gone or will be phased out in the coming months. Also likely to be retired are all non-training J-7s – except the later J-7E, J-7G and J-7L models – as well as the last non-upgraded J-8IIs.

Summary

It appears that, by late October, 11 bases had been identified, with two per command except for the Western Command, ►



Above: Within the PLAAF the Z-10 attack helicopter is currently unique to the 15th Airborne Corps, one of the Special Function Brigades, based in Southern Theatre Command but directly assigned to the HQ in Beijing. This mixed formation is headed by Z-10K 6321.

Aviation units assigned to Eastern Theatre Command

Code	Unit (Division/Regiment)	Base	Aircraft type	Remarks
Operational frontline units				
10th Bomber Division			HQ Anqing	
20x1x (01-49)	28th Air Regiment	Anqing North	H-6K	
20x1x (51-99)	29th Air Regiment	Luhe/Ma'an	H-6H, Y-8T (GX-4)	Air base also known as Daxiao
21x1x (01-49)	30th Air Regiment	Luhe/Ma'an	H-6M	Formerly based at Dajiaochang (?)
26th Special Mission Division			HQ Wuxi-Shuofang	
3007x 3017x 3037x	76th Airborne Command and Control Regiment	Wuxi-Shuofang	KJ-500 (GX-10), KJ-200 (GX-5), Y-8C	Aircraft were renumbered in mid-2017
3027x 3087x	77th Airborne Command and Control Regiment (det)		KJ-2000, Y-8T (GX-3)	Aircraft were renumbered in mid-2017
30x7x (51-99)	77th Air Regiment	Nanjing-Daiiaochang	Y-7-100, Y-7G	Air base also known as Daxiao
30x7x (51-99)	77th Air Regiment – Search and Rescue Detachment	Nanjing	Z-8KA, Mi-171, Y-5	
30x7x (51-99)	78th Electronic Warfare Regiment	Anqing North	Y-8C, Y-8CB (GX-1), Y-8G (GX-3), Y-8XZ (GX-7)	Status unconfirmed Former 30th AR, re-formed in mid-2017
UAV Division				
?	1st UAV Battalion	Ningbo/Zhuangqiao	BZK-005, BZK-006 (?)	
?	2nd UAV Battalion	Daishan	BZK-005, BZK-007	
Fuzhou Base			HQ Fuzhou	
20x5x (01-49)	40th Air Regiment	Nanchang-Xiangtang	J-11A, Su-27UBK	Reportedly now a brigade
65x2x (51-55)	41st Air Brigade	Wuyishan	J-11B, J-11BS	
21x5x (01-49)	42nd Air Regiment	Zhangshu	J-7E	Reportedly now a brigade
69x6x	85th Air Brigade	Quzhou	Su-30MKK	Reportedly reassigned from Shanghai to Fuzhou Base
79x1x	180th Unmanned Attack Brigade*			
?	1st Dadui	Liancheng Longyan Guanzhi	J-6W/B-6 UCAV	Also FOB
?	2nd Dadui	Yangtang Li	J-6W/B-6 UCAV	Located in the Guangzhou MR/Southern Theatre Command
?	3rd Dadui	Wuyishan	J-6W/B-6 UCAV	
?	4th Dadui	Ji-an/Taihe Liancheng	J-6W/B-6 UCAV	Air base also known as Jinggangshan
?	5th Dadui	Fuzhou	J-6W/B-6 UCAV	
Shanghai Base			HQ Quzhou	
61x8x	7th Air Brigade	Wuhu	J-16	
61x9x	8th Air Brigade	Changxing	J-10A/AS	
62x0x	9th Air Brigade	Wuhu	Su-30MKK	
68x9x	78th Air Brigade	Shanghai-Chongming Island	J-8DH, JJ-7A	
69x4x	83rd Air Brigade	Hangzhou-Jianqiao	JH-7A	
31x9x (01-49)	84th Air Regiment	Jiaxing	JH-7A	Status unconfirmed, could now be a brigade
69x7x	86th Air Brigade	Rugao	J-7E, JJ-7A	
70x4x	93rd Air Brigade	Suzhou	JZ-8F, JJ-7A	Also known as Suzhou-Guangfu

Notes: FOBs at Longtian, Luocheng/Huian, Xiapu and Zhangzhou.

* Organisational structure of this unit is unclear since it consists of several subunits (Fendui) dispersed over various airfields. Known so far are:

60F = Xingning, 61F = Liangcheng, 70F = Wuyishan, 71F = Jinjiang (Quanzhou-Jinjiang), 75F = Hui'an (Luocheng/Hui'an), 80F = Longtian, also FOB, 85F = Fuzhou.

Notes on ORBATs

The following ORBATs list only the most important operational units in terms of combat and combat support, including transport and special mission units. Training units, including the flying academies and the aviation university, as well as the different liaison units, are not listed.

Abbreviations:

AR: Air Regiment

FOB: forward operating base

MR: Military Region

TR: Transport Regiment



Above: This J-8DH (68298) carries a centreline BM-KZ900 pod for gathering signals intelligence. The operating unit is the 78th Air Brigade at Shanghai-Chongming Island, assigned to the Shanghai Base.



Above: This landing JL-9 (78427) is flown by the Flight Test and Training Centre's 171st Brigade based at Cangzhou-Cangxian. This is a dissimilar air combat training regiment that is also equipped with the J-7E/JJ-7A and J-8B/D/F.

Aviation units assigned to Southern Theatre Command

Code	Unit (Division/Regiment)	Base	Aircraft type	Remarks
Operational frontline units				
	8th Bomber Division			HQ Leiyang
18x9x (01-49)	22nd Air Regiment	Shaodong	H-6K	Air base also known as Shaoyang
10x9x (51-99)	23rd Air Regiment	Leiyang	HU-6	
11x9x (00-50)	24th Air Regiment	Leiyang	H-6K	Also mention of Yantang Li/Xingning as air base
	13th Transport Division			HQ Wuhan-Paozhuwan
20x4x (01-49)	37th Air Regiment	Kaifeng	Y-8C	
20x4x (51-99)	38th Air Regiment	Wuhan-Paozhuwan	IL-76MD/TD, IL-78	
21x4x (01-49)	39th Air Regiment	Dangyang	IL-76MD/TD	
	20th Special Division			HQ Guiyang-Leizhuang
30x1x (01-49)	58th Air Regiment	Guiyang-Leizhuang	Y-8CB (GX-1), Y-8G (GX-4)	Plus a detachment at Jiaxing
30x1x (51-99)	59th Air Regiment	Luzhou-Lantian	Y-7, Y-8G (GX-4)	Based within Western Theatre Command
31x1x (01-49)	60th Air Regiment – Psychological Warfare Squadron	Guiyang-Leizhuang	Y-8XZ (GX-7), JZ-8F, JJ7A	
	Kunming Base – assignments still unconfirmed			HQ Kunming
	9th Fighter Division (still a division?)			HQ Shantou NE
20x0x (01-49)	25th Air Regiment	Shantou Northeast	J-7E	Air base also known as Shantou/Waisha
20x0x (51-99)	26th Air Regiment	Huizhou-Huiyang	J-10A/AS	Former 103rd AR/35th Division, coded 4xx6x;
21x0x (01-49)	27th Air Regiment	Pulandian	J-7D, JJ-7A	Reports also mention Shantou Northeast as air base
	18th Fighter Division (still a division?)			HQ Changsha
66x5x	54th Air Brigade	Changsha/City	Su-30MKK	Some wearing green/brown camouflage scheme for dissimilar training; also known as Changsha/Datuopu
	Nanning Base			HQ Nanning Wuxu
61x5x	4th Air Brigade	Foshan	J-8DH, JJ-7A	
61x6x	5th Air Brigade	Guilin	J-10B	Air base also known as Lijiacun
61x7x	6th Air Brigade	Suixi	Su-35, Su-27SK/UBK, J-11A	
73x5x	124th Brigade	Bose/Tianyang	J-10A/AS	
73x6x	125th Brigade	Nanning-Wuxu	J-7H, JJ-7A	Reportedly converted to J-8H (unconfirmed)
73x7x	126th Brigade	Liuzhou/Bailian	JH-7A	
74x1x	130th Air Brigade	Mengzi	J-10A	
74x2x	131st Air Brigade	Luliang	J-10B/C, J-10AS	

Note: FOBs at Jinjiang, Quanzhou and Yangtang Li

which has three. It can also be assumed that, by late 2017, all fighter, fighter-bomber and ground-attack regiments as well as their parent divisions were either already, or in the process of being, disbanded, and that the regiments are being converted to brigades.

Information gathered suggests the current reorganisations seem to be comprehensive rather than incremental – and related to the system of aircraft numbers. Currently, all five-digit serial numbers beginning with 1, 2, 3 and 4 – except in the units yet to be converted – are reserved for larger aircraft and strategic assets including transport (4th and 13th Divisions), special missions (10th, 16th, 20th and 26th Divisions) and bomber units (8th, 10th and 36th Divisions).

It's also thought that serials beginning with 5 are reserved for 'Theatre-subordinated' units (SAR, reconnaissance, survey and transport) such as the recently revealed SAR brigades flying the Z-8K, Mi-171 and Y-7; and that the second number is taken from 1 to 5 in a clockwise (or protocol order) pattern, starting with the Eastern Theatre and ending with the Central Theatre.

Serial numbers beginning with 6 and 7 are reserved for tactical assets including fighter and ground-attack brigades. Meanwhile, serials starting with 8 are reserved for the PLANAF; and 9 for the PLA Army Aviation Brigades, although this system only applies for five-digit numbers.

Eastern Theatre Command (ETC)

As noted, one of the primary goals of the PLA's modernisation effort is to develop military options for addressing the situation with regard to Taiwan. Although tensions have decreased considerably in recent years, and both sides have reached agreements for cross-Straits co-operation on several issues, Beijing still officially considers Taiwan to be a 'renegade' province within the People's Republic. Despite occasional signs of impatience, China appears content to respect Taiwan's current approach to cross-Straits relations: nevertheless, the PLA has developed and deployed military

Aviation units assigned to Western Theatre Command

Code	Unit (Division/Regiment)	Base	Aircraft type	Remarks
Operational frontline units				
4th Transport Division				QH Qionglai; also known as Qionglai-Sangyuan
10x5x (01-49)	10th Air Regiment	Chengdu-Qionglai	Y-8C, Y-9	
10x5x (50-99)	11th Air Regiment	Chengdu-Qionglai	Y-7H	
11x5x (01-49)	12th Air Regiment	Chengdu-Qionglai	Mi-17V-5, Y-7-200A, Y-7H, An-26, Y-20A	
Ürümqi Base				HQ Ürümqi; also known as Wulumuqi
62x7x	16th Air Brigade	Yinchuan/West	Su-27SK/UBK, J-11, J-11BS	
72x0x	109th Air Brigade	Changji	J-8F/G/H, JJ-7A	
72x1x	110th Air Brigade	Ürümqi South (Wulumuqi)	JH-7A	
72x2x	111th Air Brigade	Korla-Xinjiang	J-11A, J-11B/BS, Su-27UBK	Air base also known as Bayingol. Gained more J-11As in 2016
72x3x	112th Air Brigade	Malan/Uxxaktal	J-7B, JJ-7A	
78x9x	178th UAV Brigade	Malan/Uxxaktal	WD-1K	
Lanzhou Base				Assignments still unconfirmed
Lhasa Base – assignments still unconfirmed				
33rd Fighter Division (still a division?)				HQ Chongqing-Shashi
40x4x (01-49)	97th Air Regiment	Dazu	J-7E, JJ-7A	Eagle badge worn on tail; status unconfirmed
40x4x (51-99)	98th Air Regiment	Chongqing-Shashi	J-11A, Su-27UBK	Eagle badge worn on tail; reportedly now a brigade; base also known as Baishi
41x4x (01-49)	99th Air Regiment	Chongqing-Shashi	J-7BH	Reportedly under conversion to J-7E/L or G; status unconfirmed, most likely disbanded

Note: FOBs at Lhasa/Gonggar, Zunyi-Xinzhong, Shigatze (Kunming Base?)

capabilities to coerce Taiwan.

Following the latest restructuring, the main importance of today's ETC – the former Nanjing MR – lies in its proximity to Taiwan, while the adjacent Southern Theatre Command acts as a backup in case of a crisis, similar to the former Guangzhou MR.

Primary responsibility remains air defence of the eastern provinces and the city of Shanghai. However, this area includes a significant number of major bases for PLA ground forces and missile units.

In recent years the PLAAF has reinforced local units through the introduction to service

of types including the J-11A, Su-30MKK, JH-7A and support platforms based on the Y-8 transport. A division equipped with the latest H-6K bombers has also been added. The availability of all these assets and the much-improved training not only point to the importance of this command but also ▶



Above: Headquartered at HQ Wuxi-Shuofang, the 26th Special Mission Division includes the 76th Airborne Command and Control Regiment that is responsible for the PLA's KJ-200 (seen here) and KJ-500 airborne early warning aircraft. Serial 30171 was renumbered as such in mid-2017.

Aviation units assigned to Northern Theatre Command

Code	Unit (Division/Regiment)	Base	Aircraft type	Remarks
Operational frontline units				
	16th Specialised Division			HQ Shenyang Dongta
20x7x (01-49)	46th Air Regiment	Shenyang Yu Hung Tun	JZ-8F, JJ-7A	Air base also known as Shenyang-Yuhong
20x7x (51-99)	47th Air Regiment	Shenyang Yu Hung Tun	Y-8C, Y-8CB (GX-1), Y-8G (GX-4)	
21x7x (01-99)	48th Air Regiment	Shenyang Dongta	Y-7-100	Reports also mention Tongxian as air base
21x7x (01-99)	48th Air Regiment (det)	Tongxian	Y-5, Y-7, Z-9WZ	
	Dalian Base			
69x9x	88th Brigade	Dandong/Langtou	J-7E	
70x0x	89th Brigade	Pulandian	J-11B/BS	
70x1x	90th Brigade	Wafangdian	Q-5B, Q-5J	Status unconfirmed; reportedly to receive J-10C
70x2x	91st Brigade	Liuhe	J-7H	Reportedly to receive J-11B/BS
Assignments still unconfirmed				
	1st Fighter Division (still a division?)			HQ Anshan
10x2x (01-49)	1st Air Regiment	Anshan	J-11B/BS	Reportedly now a brigade; using older AL-31F instead of WS-10A engines
61x3x	2nd Air Brigade	Chifeng	J-10A/AS	Reportedly to receive J-10B or J-10C
61x4x	3rd Air Brigade	Anshan	J-8F, JJ-7A	
	5th Ground-Attack Division (still a division?)			HQ Weifang-Weixian
10x6x (01-49)	13th Air Regiment	Weifang-Weixian	Q-5LJ (unconfirmed)	Reportedly now a brigade, reportedly to receive JH-7A; also known as Linyi/Weifang
61x6x	15th Air Brigade	Weifang-Weixian	JH-7A	
	11th Ground-Attack Division (still a division?)			HQ Siping
64x2x	31st Air Brigade	Siping	JH-7A	
20x2x (50-99)	32nd Air Regiment	Dalian Sanshilipu	Q-5	Status unconfirmed; likely disbanded
21x2x (01-49)	33rd Air Regiment	Gongzhuling Huaide	Q-5, Q-5J	Status unconfirmed; likely disbanded
	21st Fighter Division (still a division?)			HQ Qiqihar
67x2x	61st Brigade	Yanji	J-10B, J-10AS	Also known as Yanji/Chaoyangchuan
30x2x (51-99)	62nd Air Regiment	Qiqihar	J-8DH/H/F, JJ-7A	Also known as Qiqihar-Sanjiazi. Status unconfirmed, could now be a brigade
	Jinan Base - assignments still unconfirmed			
	12th Fighter Division (still a division?)			HQ Jinan
64x5x (01-49)	34th Air Brigade	Qihe	J-10A/AS	
20x3x (51-99)	35th Air Regiment	Gaomi	J-8II, JJ-7	Reportedly to gain J-10B/C
20x3x (01-49)	36th Air Regiment	Wendeng	J-7G, JJ-7A	Reportedly to gain J-10A
	19th Fighter Division (still a division?)			HQ Jining
30x0x (01-49)	55th Air Regiment	Jining	J-11, Su-27SK/UBK	
30x0x (50-99)	56th Air Regiment	Zhengzhou	J-10B, J-10AS	
	32nd Fighter Division (still a division?)			HQ Lianyungang, Baitabu
40x3x (51-99)	95th Air Regiment	Lianyungan, Baitabu	J-11B/BS	Status unconfirmed, could now be a brigade
Note: FOBs at Hailar/Southwest				

make this air arm capable of saturating Taiwan with superior numbers of technologically advanced aircraft.

A unique and little-understood unit is a brigade equipped with retired J-6 fighters converted to J-6W/B-6 unmanned combat aerial vehicles (UCAVs) acting as decoys to probe, disrupt or even suppress enemy air defence systems.

Southern Theatre Command (STC)

Following the PLA's reorganisation, the Southern Theatre Command – which succeeded the Guangzhou MR – has been responsible for air defence of the southern provinces, including the Hong Kong Special Administrative Region and Macau. Akin to the former Guangzhou MR, the STC is the second of two regions facing Taiwan. Strategic importance is added by the fact that it also faces Vietnam and the Philippines, and includes Hong Kong and the flourishing economic zones surrounding it. The PLA's 15th Airborne Army is based in the same area, but is directly assigned to the HQ in Beijing. However, its most important geographical area is undoubtedly the South China Sea (SCS) and the issues surrounding the islands there.

While in control of the extensive air defences in the southern sector, it was only relatively recently that the Guangzhou MR was able to exercise effective military control over the SCS too. The most obvious factors in this transformation are the H-6 bombers and Su-30MKK fighter-bombers, which possess an in-flight capability that enables them to reach the Spratlys, for example, and the assignment of the newly acquired Su-35



Left: Ürümqi Base is responsible for one of the PLAAF's recently established UAV units: the 178th Air Brigade at Malan/Uxxaktal. This is one of its WD-1K drones, the air force's first armed UAV.

Su-30MKK 62308 is a 9th Air Brigade aircraft. Based at Wuhu, the unit falls under the command of the Shanghai Base.



to this sector. Since 2008, the PLAAF has been observed several times over the SCS operating large groups of tactical aircraft, supported by tankers and airborne early warning and control platforms. However, only a few regiments are equipped with these 'force-multiplier' types, and this shortage has been addressed by constructing numerous airfields on artificial islands. The availability of long-range fighters and aerial refuelling assets implies that much of the SCS is now de-facto Chinese airspace, or at least that the PLAAF and PLANAF are able to ensure virtually continuous aerial coverage and combat air patrols over the area during any crisis or conflict. This is something that no other country with claims in the area is able to match.

Some foreign observers and the other SCS claimants have expressed concerns that new military airfields constructed in the area are now inevitable, and that establishment of an air defence identification zone (ADIZ) is at least feasible – albeit unlikely in the immediate future. Despite official declarations from Beijing to the contrary, the PLA is meanwhile expected to begin at least temporary if not permanent deployments to

the area. This will likely involve units equipped with types such as the J-11 and runs the risk of further increasing tensions.

Western Theatre Command (WTC)

For many years the Chengdu MR – serving as the major PLAAF grouping responsible

for the defence of southern and southwest China – covered the majority of this area with the exception of the Guangzhou MR, which was responsible for the border with Vietnam. The Chengdu MR included the remaining parts of the autonomous region of Xizang (Tibet) and the directly

controlled municipality of Chongqing. This comprised the entire border from northern Vietnam to Nepal. In line with the recent structural reform this already vast area further expanded, since large portions of the Chengdu MR were merged with the Lanzhou MR. The latter had been responsible for

Aviation units assigned to Central Theatre Command

Code	Unit (Division/Regiment)	Base	Aircraft type	Remarks
Operational frontline units				
36th Bomber Division			HQ Lintong	
98x 87x 60xx	106th Aerial Survey Regiment	Hanzhong-Chenggu	Y-8H, An-30, Y-12-IV	Status unclear, now most likely an independent AR
40x7x (01-49)	107th Air Regiment	Lintong	H-6H	Status unclear; base also known as Xi'an/Lintong
40x7x (51-99)	108th Air Regiment	Wugong	H-6H/M, H-6K	
Datong Base – assignments still unconfirmed				
7th Fighter Division (still a division?)			HQ Zhangjiakou	
70x0x	19th Air Brigade	Zhangjiakou	J-11B/BS	
15th Ground-Attack Division (still a division?)			HQ Datong-Huairan	
20x6x (01-49)	43rd Air Regiment	Datong-Huairan	J-10A/AS	Status unconfirmed, could now be a brigade
20x6x (50-99)	44th Air Regiment	Hohhot-Bikeqi	J-7G, JJ-7A	Status unconfirmed, could now be a brigade
21x6x (01-52)	45th Air Regiment	Quzhou-Dingxian	Q-5B/C/L/J	Status unconfirmed
24th Fighter Division (still a division?)			HQ Tianjin Yangcun	
30x5x (01-49)	70th Air Regiment	Zunhua	J-7G, JJ-7A	Status unconfirmed, could now be a brigade, air base also known as Dongxinzhuang
30x5x (51-99)	72nd Air Regiment	Tianjin Yangcun	J-10A/AS	Status unconfirmed, could now be a brigade
0x 1x	Ba Yi (August 1) Aerial Demonstration Team	Tianjin Yangcun	J-10AY, J-10SY	
Wuhan Base – assignments still unconfirmed/unknown				
Note: FOBs at Baoji, Xishanbeixiang (Tong Lin Chuan)				

Aviation units directly assigned to PLAAF Headquarters/Central Command

Code	Unit (Division/Regiment)	Base	Aircraft type	Remarks
	Flight Test and Training Centre (FTTC)			HQ Cangzhou-Cangxian – also known as 26th Air Base
76x2x	151st Air Brigade	Cangzhou-Cangxian	WD-1K/GJ-1 UCAV	First dedicated UCAV unit
76x7x	156th Air Brigade	??	J-7E	Unconfirmed, but aircraft identified
78x1x	170th Air Brigade	Jiugucheng	J-10A/AS, J-10B/C, JL-9	
78x2x	171st Air Brigade	Cangzhou-Cangxian	J-7E/JJ-7A, J-8B/D/F, JL-9	Dissimilar air combat training regiment
78x3x	172nd Air Brigade	Cangzhou-Cangxian	Su-30MKK, J-16, JL-10	Reportedly converted or under conversion to J-16
78x6x	175th Air Brigade – Tactical Training Centre (TTC)	Dingxin/14th Air Base	Various (J-7H, JJ-7, J-8F, J-11A/B, JH-7A, Q-5, Y-5, Y-7, Y-8)	Former special mission testing unit, 'Blue Force' unit
78x7x	176th Air Brigade	Dingxin/14th Air Base	J-10C (unconfirmed), J-16, J-20A	Operational trials regiment
	China Flight Test Establishment (CFTE)			HQ Xi'an-Yanliang – also known as Flight Test Evaluation Centre
	China Flight Test Establishment (CFTE)	Xi'an-Yanliang	Various	
	CFTE AEW test facility unit	Dingxin/14th Air Base	Various AEW types	
	15th Airborne Army – formerly 15th Airborne Corps			HQ Xiaogan
6x1x	1st Transport Dadui	Yingshan/North Guangshui	Y-5, Y-7	Former 6th Transport Regiment
6x1x	1st Transport Dadui (det)	Kaifeng	Y-8C	
6x1x	3rd Transport Dadui	Xiaogan	Y-5, Y-12IV	
6x1x	3rd Transport Dadui	Xiaogan	Y-7	
6x2x	4th Helicopter Dadui	Huangpi	Z-8KA, Z-9WE/WZ, Z-10K	
	34th Transport Division			HQ Beijing-Nanyuan – reports directly to HQAF
B-401x B-406x B-409x B-400x B-402x B-408x	100th Air Regiment	Beijing/Xijiao	CRJ-200BLR, CRJ-700, A319-115 ACJ, 737-300, 737-700, 737-800	
21xx	100th Air Regiment (det)	Beijing/Shahenzhen	EC225, AS332L-1	
B-407x B-601x	101st Air Regiment	Xingtai-Shahe	Y-7, Y-7G	Air base unclear, perhaps also at Shahe (Hebei)
B-401x B-405x B-408x	102nd Air Regiment	Beijing-Nanyuan	Tu-154M/D, 737-3Q8, Learjet 35A/36A	
6x1x	202nd Air Regiment	Beijing/Shahenzhen	Z-8K, Z-9B	Most likely former MR liaison AR; air base also known as Shahe
6x1x 6x2x	203rd Air Regiment	Beijing/Shahenzhen	Y-5, Y-7	Most likely former MR liaison AR; air base also known as Shahe
6x3x	??? Air Regiment	Baoji	Y-5	
	Strategic UAV Scouting Force			
?	Unknown UAV unit	Xingtai-Shahe	CJ-6, BZK-005 BZK-009 (?)	Directly subordinated to PLA General Staff Department

the air defence of the complete western and southwestern sector including the autonomous regions of Ningxia Hui, Qinghai, Xinjiang Uyghur and the Ngari Prefecture. As a consequence, the WTC became the largest (in terms of area) of the five new theatre commands.

At first sight the military importance of this command might appear limited, since it covers the most sparsely populated parts of China. But this is where some of China's most secretive military facilities can be found – including the Lop Nor nuclear research site ('Base 21') and various missile and electronic warfare test facilities, as well as the important industrial centre of Xi'an. However, its main importance lies in its proximity to the disputed border with India.

From the standpoint of Beijing, full-scale military conflicts with most of its neighbours in this area are unlikely. One exception is India, and here it is important to state that the PLAAF perceives that the Indian Air Force (IAF) considers itself foremost an offensive arm. Bearing in mind this tense situation, one might expect numerous bases in close proximity to India. However, because of the mountainous terrain and difficult weather conditions, the Tibet Autonomous Region (TAR) area features barely any permanent, major PLAAF bases. Nevertheless, China has established a dense airport network, as well as a series of FOBs that could be used in a conflict. Although no frontline PLAAF elements are permanently based here, regular rotational deployments to the TAR are an important part of the training doctrine.

In the western part of the WTC, China's relationships with countries such as Afghanistan, Mongolia, Russia and the former republics of the Soviet Union – namely Kazakhstan, Kyrgyzstan and Tajikistan – has concentrated on finding solutions to the various border disputes, some of which date back to the 19th century, maintaining good diplomatic and economic ties, but otherwise not interfering in internal politics. Beijing is interested in maintaining stability and security in Central Asia not

only for economic reasons, but also because of the potential instability of the Xinjiang Uyghur Autonomous Region.

Northern Theatre Command (NTC)

Considering the generally cordial relations between the PRC and all of its northern neighbours in the last 20 years, mutual conflicts in the region are very unlikely. The Chinese side of land bordering neighbours in Central and Northern Asia (Russia and Mongolia) was controlled by the former Lanzhou and Beijing MRs, of which the latter was the most powerful and most important. Following the reorganisation, the former Lanzhou MR was merged into the Western Theatre Command, while the former Beijing and Shenyang MRs were reorganised as the Northern and Central Theatre Commands that now also cover Japan and the Koreas.

Since 2005, China and Russia have run several joint 'Peace Mission' military exercises, covering air, land and sea elements, usually simulating an intervention in a country in a state of political turmoil. These manoeuvres include establishing aerial and naval blockades, amphibious assaults and deploying ground troops for the purpose of occupying a region. While some Western observers argue that these exercises are designed to intimidate Taiwan, others consider they are used to test a possible scenario in case the North Korean government collapses.

The PLA subordinates



Above: The Search and Rescue Detachment at Nanjing operates Z-8K 51713 under the 26th Special Mission Division's 77th Air Regiment. Z-8Ks are now being distributed among recently revealed SAR brigades.

responsibility not only for the Korean peninsula but also for Japan to the Northern Theatre and to the Central Theatre Command, both of which face very different political issues. Stability and the avoidance of military conflict on the Korean peninsula appear to be among the top priorities for the government in Beijing. Nevertheless, the PRC apparently remains unable to find mutually satisfactory solutions for the disputes related to the East China Sea (ECS) that involve Japan and South Korea.

Central Theatre Command (CTC)

The Central Theatre Command is unique since it does not share borders with any neighbouring country. It is also responsible for the northeast, formerly consisting of the remaining parts of the Beijing, Jinan and Shenyang MRs. As noted, the PLAAF does not maintain any major units close to the borders of any of its neighbours in Central and Northern Asia

facing Mongolia and Russia, with the majority of PLAAF units assigned there operating only point-defence interceptors and training aircraft. The sole exception to this rule is the 36th Bomber Division, which may be considered the PRC's 'silver bullet' force. Two of this division's regiments are equipped with H-6H/M and H-6K bombers armed with land attack cruise missiles, but – according to officials in Beijing – they are not provided with nuclear warheads.

PLAAF Headquarters/Central Command

Several PLAAF units report directly to the PLA and the PLAAF HQ or the Central Command – not to be confused with the Central Theatre Command. The best known is the 34th Transport Division specialised in the movement of senior government and military officials. Others were formerly equipped solely with transport aircraft and some of these are essentially assigned directly to

the army's airborne divisions. Relatively recent additions to the Central Command's assets are the training regiments of both branches of the Aviation University, the Flight Basic Training Base and the Flight Instructor Training Base, which were established from former flight academies.

The Flight Test and Training Centre (FTTC) and the Chinese aviation industry's most important flight test and evaluation facility – the China Flight Test Establishment (CFTE) – are also subordinated under the PLAAF's HQ.

Finally, a unit directly subordinated to the PLA General Staff Department is a specialised division operating UAVs, known only as the 'Strategic UAV Scout Force', stationed near Beijing. Its primary equipment consists of BKZ-005 'Giant Eagle' and perhaps BZK-009 'Sky Wing' UAVs, which may be supplemented later in the decade by the 'Soaring Dragon II' for strategic intelligence gathering operations. **AFM**

Below: The clandestine Y-8CB (Y-8GX-1) 300012, a specialised electronic intelligence aircraft of the former 30th Air Division. This unit was reportedly reconstituted as the 78th Electronic Warfare Regiment at Anqing North earlier this year.



Raptors

ON THE ROAD



In October, F-22A Raptors from Joint Base Langley-Eustis stopped off at RAF Lakenheath for a Fighter Training Detachment en route home from combat operations in the Middle East. **Jamie Hunter** caught up with the 1st Fighter Wing team as they completed their spell in the UK.

Below: The 27th Fighter Squadron's flagship F-22 awaits its pilot outside a hardened aircraft shelter in the 493rd FS complex at RAF Lakenheath. Jamie Hunter

US Air Force Lockheed Martin F-22 Raptors seem to be permanently on the road these days. They've been deployed to the Middle East since 2009, mainly under the 380th Air Expeditionary Wing (AEW), where rotations in and out of Al Dhafra, United Arab Emirates, have provided a show of strength in the region – particularly related to Iran.

The squadrons have also played an

important role in Operation Inherent Resolve, tackling so-called Islamic State (IS). The Raptors' involvement in this mission stepped up a gear in the early hours of September 23, 2014 as the US and Arab nation allies struck at the heart of IS by attacking targets in its stronghold in Raqqa, Syria.

It became clear that for the Raptor it had been a significant event, marking the first time the F-22 had employed weapons in combat operations.



Ironically, despite being conceived as the USAF's ultimate super-fighter, its kinetic combat debut came in the air-to-ground role – Raptor pilots are able to employ the 1,000lb GBU-32 Joint Direct Attack Munition (JDAM) or the 250lb GBU-39 Small Diameter Bomb (SDB).

Six F-22s touched down at RAF Lakenheath on October 8 this year as the 27th Fighter Squadron (FS) wrapped up the latest six-month combat deployment downrange, handing their jets over to an operations team from their sister unit, the 94th FS 'Hat in the Ring' – also known as the 'Spads'.

Led by Lt Col 'Habu', commanding officer of the 94th, the jets were pressed into a Fighter Training Detachment, which made the most of the chance of having Raptors in the UK as they headed for home.

"We started pushing the idea back in the spring," 'Habu' told *AFM*. "That was partly due to the training benefit of coming here, plus our squadron has some strong historical ties to the UK: we deployed

here in 1917 in preparation for World War One, so we thought it would be a fantastic parallel to coincide this with the landmark in our squadron history."

The 1st Fighter Wing's two Raptor squadrons are the oldest units in the USAF, both marking their centenaries in 2017, tracing their lineage back to the Lafayette Escadrille – and the 94th FS 'Spads' continues to mark that heritage today.

Eastern Zephyr

The time spent in the UK was part of the so-called European Deterrence Initiative, with two small forward detachments of pairs of Raptors sent to Spangdahlem, Germany, and to Powidz, Poland, on October 13 and 17 respectively. In addition, the 'Spads' seized the chance to train alongside the Royal Air Force Typhoon Force at Coningsby, Lincolnshire.

"The training benefit we get here on the coalition front is the number one priority for our squadron and for USAFE [US Air Forces in Europe]," Lt Col 'Habu' said of the joint exercise conducted with the RAF. Exercise Eastern Zephyr was designed to build on

the relationships developed over recent years between the British Typhoons and the Raptor squadrons during exercises such as Western Zephyr and Atlantic Trident, both conducted at Langley.

The colonel added: "It's a great opportunity to integrate the fifth-generation F-22 with the Typhoons, and that leads into the wider strategic objectives of coalition and relationship building. We're also conducting some missions into central Europe to help reassure our allies."

Training alongside the RAF Typhoons involved the 'Spads' sending pilots to Coningsby to face-to-face brief the various elements of their plans, supplemented by video conferencing in the immediate lead-up to the missions.

Lt Col 'Habu' said: "We flew one big VUL [vulnerability period], and this was the first exercise where we actually fought against the Typhoons in a long-range scenario.

"Typically we're on the same side or flying 1-v-1 BFM [basic fighter manoeuvres], but this time we've also used them ▣

"We flew one big VUL [vulnerability period], and this was the first exercise where we actually fought against the Typhoons in a long-range scenario."



F-22 DEPLOYMENTS

Two main aims of the stopover at Lakenheath were the European Deterrence Initiative and integration training with RAF Typhoons. USAF/A1C Elijah Chevalie



as aggressors in a large-force exercise."

The Raptors helped provide a unique element in support of the Typhoon Qualified Weapons Instructor [QWI] Course. "The QWI Typhoon guys were on the Blue Air side with us, fighting against Red Air Typhoons, Hawks and F-15s. Today we're flying some 1-v-1 BFM against them too. We've also conducted some weapons and tactics talks – so we're really starting to solidify our relationship."

British company Inzpire had a hand in supporting Eastern Zephyr by providing a 'White Force' that helped create the mission scenarios. Capt 'Mach', a pilot on the 94th FS, commented: "It's a fantastic opportunity to use Inzpire to create all the scenario products for us."

"It means we can roll straight into mission planning having received an Air Taking Order [ATO] and Air Operations Directive [AOD] from them to provide us with a framework for the mission. They have done a lot of things a CAOC [Combined Air Operations Centre] would do, which means we can focus on the tactics, rather than coming up with the scenario. It creates a more realistic layer of the unknown for us."

Talking of the benefits of working with the Coningsby Typhoons, 'Mach' said it's been valuable to understand the way the RAF conducts its business and how it approaches problems.

"Our contracts with them are well established. For example, we flew a two-ship of Raptors with a four-ship of Typhoons. We have tactics that are platform-agnostic, so for example with a fourth-generation fighter we'll apply certain tactics, but then in our mission planning cycle we'll build on that baseline and add type-specific details."

Below: An F-22 on the EOR (end of runway) at RAF Lakenheath on October 12, ready for an Eastern Zephyr mission alongside resident 494th FS F-15Es. USAF/A1C Christopher S Sparks





Above: A 'Spads' pilot prepares to fire up the auxiliary power unit and start engines ahead of a 1-v-1 mission against an RAF Typhoon from No 3(F) Squadron. *Jamie Hunter* **Below:** The six F-22s that arrived on October 8 were pressed into local missions. Another six pitched up on October 17 as the rear party of 27th FS pilots arrived on their way home. *USAF/SrA Malcolm Mayfield*



Perhaps surprisingly, given the vastness of the US, the Raptor pilots were quick to praise the size of the UK training airspace.

"There are some great ranges here as far as space is concerned," Lt Col 'Habu' said. "They're bigger than the airspace we have back home at Langley – but here you don't have the realistic threat replication on those ranges that fifth-generation jets need. The Raptor is smart enough not to be fooled by platforms that are simulating other things; we need real threats to train against in the high-end fight."

"Also, we aren't sharing our embedded training modes with other airplanes, which means when we're doing our integration training our partners aren't seeing the same threat as we're seeing in our cockpits."

One of the Raptor's limitations in joint operations has always been its inability to share information from its incredible suite of sensors. It can receive data and share it with other F-22s, but it cannot push it out to other types.

"I think in the future we'll be able to share more information than we currently do," explained Lt Col 'Habu'. "However, it will be more about the real-time information from our sensors as opposed to what our embedded training mode is replicating." ▢





Above: One of the pair of F-22s that forward deployed to Spangdahlem in company with a KC-135R for an overnight stay on October 13. USAF/A1C Luke Milano **Below:** Raptor pilots are no strangers to deployments. The unit is typically on the road every few months. USAF/SSgt Michael Battles



Inherent Resolve

Operation Inherent Resolve is just one of the vast array of commitments the relatively small Raptor community has to support. "We're usually deployed or detached somewhere every three months for two or three weeks," explained 'Habu'.

"We don't have the entire squadron here at Lakenheath right now, and that's one way to mitigate against the deployment cycle – you just don't send everybody out all of the time."

"We have about half of our pilots here and we had some guys stay home that needed to focus on specific upgrade events. We're a small fighter squadron with just 21 active-duty pilots, so the need to support and provide continuity for those guys is huge."

The colonel was also well aware that many of the maintainers out on the flight line at Lakenheath were from the 27th FS and had come direct from a tough stint downrange and were eager to get home.

"We have a few 94th Aircraft Maintenance Unit [AMU] folks here, but most are from the 27th AMU," he said. "So essentially it's a 94th FS operations and 27th AMU maintenance team. We have enough people here to lighten the load and we're not flying a significant schedule, so it's fairly laid back."

Looking ahead, the 'Spads' will deploy again in the coming months, and this deployment to Lakenheath was seen as a good test of the squadron's ability to work away from home.

"This isn't just about our readiness to employ the Raptor, it's also about our readiness to deploy, to get our equipment and our airplanes



Taxying out under leaden skies at RAF Lakenheath for some dogfighting – regarded by fighter pilots as 'the sport of kings'. Jamie Hunter



Returning from a lengthy deployment to the Central Command region, the F-22s were noted as not being as pristine as usual due to the high usage rates and inability to correctly clean the external surfaces in theatre. USAF/SSgt Michael Battles



downrange. It's not just about taking off and landing, but it's the entire logistical support chain we need in order to get to that point."

One of the commander's support staff team got the chance to see for the first time how a deployment unfolds. She told *AFM*: "I don't usually get to see the operational side. So it's been great to come here and learn why they need a tanker, for example."

Regarding the current Inherent Resolve mission for the Raptors, despite their air-to-air focus, they have even been flying close air support (CAS) missions. Capt 'Mach' said: "We call it X-CAS [reactive CAS], because it's not quite as in-depth a mission as it is for an aircraft with a targeting pod, for example, but we're still talking to a Joint Terminal Attack Controller [JTAC]; it's just not quite as high fidelity."

A maintainer from the 27th AMU told *AFM*: "I truly realised our contribution when a pilot climbed out of Raptor '192' one night and told me how he was returning to base when he got a 'troops in contact' radio call and was able to eliminate the forces attempting to do harm to the friendly troops on the ground. I am honoured I had the opportunity to be a member of the 'Desert Fightin' Eagles' team."

Tackling squadron shortfalls

USAF Chief of Staff General Dave Goldfein has called the situation facing his fighter squadrons "a crisis". He is woefully short of pilots and experience is literally walking out of the door as airlines hire at a high rate.

Steps are being taken to address the issue: "One of the best things I've seen for fighter

squadrons in recent times is that we've now got five contractors to help us out with a lot of the administrative duties," said Lt Col 'Habu'.

His squadron of 21 active-duty pilots is supplemented under the Total Force Initiative by around 24 Air National Guard Raptor pilots across the 27th and 94th FSs, but they are mainly part-timers who dip in and out of the squadrons around their airline careers. While they bring valued experience, they aren't burdened with the mundane side of running a fighter squadron day-in, day-out.

"We're a very young squadron," said 'Habu'. "We're producing a lot of new pilots right now, which is great and we're looking to retain them in a better way, but we have a lot of experience leaving and a lot of inexperience showing up."

"One of the things that's been truly eye-opening for me is that it's not just about the combat mission, but it's the force development with a lot of young guys that we're trying to train up."

"One of the great things about detachments like this to Lakenheath is that being away from home puts people in unique situations that aren't the standard scripted scenarios they're used to back at home."

"For example, one of the young pilots that flew a jet back from Poland was doing his first overseas cross-country trip. There's inherent airmanship that comes with that and it's the experience we need to get. It goes beyond the tactical element we achieve through our integration with the Typhoons. We gain experience by creating those situations." **AFM**

RAFALE ^{IN} CHAMMAL

Three years on from the launch of Opération Chammal, the French military campaign against so-called Islamic State, **Jean-Marc Tanguy** examines the Rafale mission and talks to the Chief of the Staff of the French Air Force André Lanata.



The Armée de l'Air (French Air Force) contribution to Opération Chammal involves special operations forces commandos, E-3F AWACS airborne early warning and control aircraft, C-135FR tankers and a range of transport assets. However, perhaps its most prominent assets are the Armée de l'Air Rafales spearheading strikes against so-called Islamic State (IS) – Daesh in French armed forces parlance.

On the night of *AFM*'s visit to their Jordanian base earlier this year, the Armée de l'Air Rafales were playing the role of the 'dambusters'. The fighters were not armed with exotic munitions, but carried the familiar 2,000lb (907kg) GBU-24 Paveway III laser-guided bomb (LGB) on their centreline hardpoint. Two Rafales, two GBU-24s, and two direct hits on a bridge near Raqqa in Syria.

The mission was part of a wider plan to isolate the besieged city, which is on the northeast bank of the Euphrates River. On this occasion more than ten aircraft were involved: the French Rafales, a US Air Force B-52H, and an undisclosed

British aircraft – perhaps a Royal Air Force Voyager tanker.

Each day and night, the six Rafales take off from their forward location in Jordan (at the request of the Jordanian authorities, the French do not publicise the precise location or name of the airfield). The Rafales mainly drop a combination of 500lb (227kg) GBU-12 Paveway II LGBs, AASM (Armement Air-Sol Modulaire) guided munitions and SCALP cruise missiles.

Spectrum of experience

Many of the Armée de l'Air Rafale pilots arrive in the Middle East with only a few hundred flying hours on the type. For some, it is their first experience of war. Others have previously flown the Mirage F1CR or the Mirage 2000N in combat. The more experienced crew will have already flown tours of duty against IS, either in the



Above: French pilots appreciate the 'Rafale weapon system', which gives them the ability to prosecute a wide range of missions with one aircraft. This pilot's helmet wears the insignia of Escadron de Chasse 2/30 'Normandie-Niemen'. All photos Jean-Marc Tanguy unless stated



Rafale C 120 '30-IY' departs its base in Jordan to begin a SCALP-EG sortie. These are considered national missions and involve special rules of engagement. The validation process for the tasking is different from that of close air support missions, which require only authorisation from the CAOC. Armée de l'Air



Above: French groundcrew apply these mission markings to their forward-deployed Rafales. This aircraft has fired at least six SCALP-EGs, 27 AASMs and ten GBU-12s (Rafales don't launch GBU-49s).

Middle East or in Africa, where the air force has been fighting a separate campaign against Islamist terrorist groups since 2013.

All those pilots who spoke to *AFM* expressed their appreciation for the Rafale, which was praised for its accuracy as a weapons platform and its ready availability on the flight line. At the time of the visit earlier this year, no mission had been cancelled for technical reasons since the Rafales' arrival in Jordan in summer 2016. The fighters replaced the Mirage 2000D and Mirage 2000N-K3 in theatre.

The Rafale's ability to carry more than three times the bomb load of the Mirage 2000D is also widely lauded, including by the air taskers on the ground (Joint Terminal Attack Controllers, JTACs) and those in the Combined Air Operations Centre (CAOC) at Al Udeid in Qatar, where an Armée de l'Air general is the French 'Red Card Holder' (RCH). After ground troops make their requests for air assets to the CAOC, the centre looks at the means available to include requests in the mission orders for the next 24 hours. The RCH, assisted by a legal adviser, will, depending on the particular mandate, accept or reject each mission.

French rules of engagement (RoE) are very strict, but according to the testimonies of French personnel in

Jordan and in France, not many strikes have been called off in flight.

Support assets

French fighters have been taking the war to IS since September 2014, but they do not work alone. Equipped for signals intelligence (SIGINT) missions, the Gabriel (a modified C-160 Transall) is available to detect and locate terrorist radio and phone communications. French nationals and French-speakers from Belgium and North Africa are fighting with IS, and the Direction du Renseignement Militaire (DRM, French military intelligence) is tasked with tracking them using this dedicated asset, which also flies from Jordan.

The DRM is also reported to make use of airborne intelligence, surveillance and reconnaissance (ISR) assets furnished by a private European company, paralleling tactics used in Africa.

The Rafales might also find themselves working with a special operations forces (SOF) detachment on the ground near Mosul in Iraq. This is Task Force Hydra, which comprises 200 operatives. The latter include troops from the 1er Régiment de Parachutistes d'Infanterie de Marine (1er RPIMA, 1st Marine Infantry Parachute Regiment), Commandos Marine (French ▶

A Rafale stands ready to destroy a high-value target. Most SCALP-EG missions have occurred around Raqqa and Mosul. Air force Rafales carry two of these cruise missiles, while French Navy jets carry only one, on the centreline. Armée de l'Air



Interview

Earlier this year, **AFM** spoke exclusively to the Chief of the Staff of the French Air Force André Lanata about the Opération Chammal mission in the Middle East.

AFM: What kind of missions do you fly from Jordan?

CAS Lanata: "Day and night, French aircrews take off for kinetic engagements over Iraq and Syria. They fly either to support the progress of ground troops (close air support) or to destroy pre-planned targets (aerial interdiction) related to the Daesh military inventory."

What is your relationship with the Royal Jordanian Air Force that hosts you here?

"The French Air Force has a long-lasting friendship with the Royal Jordanian Air Force. Our airmen used to fly identical aircraft [ie the Mirage F1], which helped to strengthen our co-operation. The support given by the Royal Jordanian Air Force to the French deployed on the base is outstanding. Thanks to their commitment, our Rafale detachment is able to maintain the requested level of readiness."

With such a wide spectrum of assets, how do you assess the overall French Air Force contribution to the fight against IS?

"The French Air Force provides a significant contribution to France's commitment in the fight against Daesh. We have talked about the type of missions we are flying. More important is the fact that our assets and missions are part of a combined air campaign. This campaign includes kinetic engagements, but also ISR missions, air-to-air refuelling, air mobility, command and control assets – including AWACS. Together with its partners engaged in Operation Inherent Resolve, the French Air Force participates in a global, patient, and systemic effort – the only way to remove Daesh's military power."

Your foe is a terrorist army and mainly operates in urban areas. How do you manage within these constraints?

"Daesh has developed a structured political, financial and military system. The enemy also uses asymmetrical and unconventional tactics such as hiding and fighting in heavily populated areas. This is the reason why the air campaign focuses both on weakening Daesh as a system by aiming at its centres of gravity – communication nodes, IED [improvised explosive device] production facilities, etc – and by offering close air support to ground forces in urban areas, using exclusively precision-guided munitions – GPS and laser – to avoid civilian casualties by all means."

"Working hand in hand with our international partners in the CAOC, we ensure aircrews abide by the rules of engagement, avoiding any collateral damage on civilians or friendly forces. More than

just delivering bombs, there is an important strategic dimension in our ability to control the military effects produced by air power."

What are the main lessons learned after three years of air operations?

"The first lesson learned is: the air campaign is working. Without this organised use of air power, where would we be now? Thanks to this patient effort from the air, the progress of friendly forces on the ground has been made possible. With the invaluable help of air power, Daesh has lost major geographical areas in Iraq and in Syria. Daesh has lost the initiative... it is on the defensive.

"The second lesson learned immediately follows the first: be prepared for a long fight. Despite these recovered territories, the work is far from being over. In this regard, we need to look at the way we can optimise our human and material resources in order to sustain this effort over the long term.

"The third lesson is that we need to strengthen the key enablers of the air campaign: ISR, air-to-air refuelling, precision munitions. These are the critical factors for success, but also the major limitations of this campaign. The fighter sorties we are flying depend directly on the numbers of available tankers, the number of targets gathered by intelligence assets, and the diversity of precision-guided munitions."

What does the Rafale bring in particular?

"The Rafale offers a wide range of air power effects – it was designed as a multi-role platform since its conception. Moreover, its strength lies in its real-time sensor fusion capability, enabling the aircrew to prosecute any target via any of the onboard sensors – radar, electro-optical, infrared, laser designation pod – or other sources of information – wingman, Link 16, UAV, AWACS. The Rafale has operated in combined environments in multiple theatres since 2008. It is totally interoperable, and works superbly with the vast range of assets that comprise the coalition."

The Mirage 2000D and 2000N did the job too, flying five times as many hours as they do in France.

"They certainly did the job, having been

deployed in Jordan for two years! The precise reason for replacing them with the Rafale in August 2016 was because their extensive use was beginning to generate fatigue on both airframes and aircrews. Nevertheless, they were redeployed to Africa from October 2016."

What is your munitions consumption, type by type?

"As I said, we have been exclusively using precision-guided munitions, relying on either GPS, laser or infrared imagery. The inventory encompasses French weapons, such as the SBU-38 [INS/GPS AASM], SBU-54 [dual-mode INS/GPS/laser AASM], SBU-64 [dual-mode INS/GPS/IR AASM], SCALP [standoff cruise missile], and American guided bombs [GBU-12, -16, -24].

"By the end of January this year, French fighter aircraft had delivered 2,300 weapons since the beginning of the air campaign in September 2014, and doubling the delivery ratio in 2016."

The Aéronavale arrived in Jordan this year for two periods of operations. How do you manage their contribution? And how do you integrate their Atlantique 2 ISR asset that was already in Jordan?

"The Aéronavale deploys its own navalised Rafale in Jordan. They operate from the same base, co-located with the French Air Force Rafales in order to optimise logistics and spare parts. Our aircrews are used to working together. Having the same aircraft certainly helps. For instance, the Rafale operational conversion unit [Escadron de Chasse 2/4 'La Fayette'] located at Saint-Dizier trains both air force and navy pilots.

"The Atlantique 2 was already stationed at the same air base, and brings an important added value to the fight in terms of ISR."

How do you co-operate with the Royal Air Force and the US Air Force?

"The co-operation with the UK and US air forces is historical, dating back to the First World War. Today, co-operation between our three air forces is structured through the Trilateral Strategic Initiative to develop trust, enhance air power advocacy and increase operational effectiveness through closer collaboration.

"Air campaigns in Serbia, Kosovo, Afghanistan,

and Libya have all relied on close trilateral exchanges. This relationship is revitalised by our shared operational commitment in the Levant, but also by common concerns regarding other sides of today's air power challenges such as A2/AD [anti-access/area denial]. We are therefore working closely on our interoperability for high-intensity scenarios in contested environments.

"Moreover, the US and the UK support the French-led operation in sub-Saharan Africa. Given the size of the area we have to cover (roughly the dimensions of Europe!), we truly appreciate the assets they bring to the fight in the domains of ISR, air-to-air refuelling and air mobility. The idea is really to maintain a permanent pressure from the air on jihadist groups scattered across this huge territory, and to strike them in real time when they emerge.

"We thus need to develop a new generation of network-centric warfare that will benefit from the full capabilities of our modern air assets and that won't be limited to fighting Daesh but be adaptive to any type of threat. This year's Atlantic Trident exercise [held at Joint Base Langley-Eustis, Virginia, in April] was a key component of this approach."

How do you manage support infrastructure at such an isolated air base?

"First of all, throughout a century of air operations, the French Air Force has developed a true expeditionary culture that enables us to deploy and operate an air base structure anywhere in the world at very short notice. Far from being limited to aircraft, this capability includes the projection of C2 [command and control] means, force protection teams, infrastructure, information systems...

"Second, and thanks to our Jordanian friends, our air base here is a bit secluded, but far from isolated. When freight is heavy and the notice is long enough, we use non-aerial means. On the other hand, when freight is urgent, we prefer to ship it by air. We occasionally use a chartered cargo aircraft, and our Airbus A310 for passengers, but our A400M Atlas is our real workhorse. Thanks to its speed, its payload of either freight or passengers, and its serviceability, we can enjoy one rotation per week, which, for a so-called isolated air base, is totally adequate."

Below: This moon-like landscape is typical of Jordan's desert close to the borders with Iraq and Syria. The Jordanian air base is usefully located for the Rafales – with two external fuel tanks they can easily fly missions of between 1hr 40mins and 2hrs.





A French Air Force Rafale plugs into the basket behind a US Air Force KC-10A tanker during an Operation Inherent Resolve mission over Iraq on March 22. USAF/Senior Airman Joshua A Hoskins

Rafale ordnance

The Armée de l'Air Rafale can carry a useful range of ordnance, comprising the 500lb (227kg), 1,000lb (454kg) and 2,000lb (907lb) laser-guided bombs of the Paveway series and three versions of the AASM (the Safran family of modular, propelled bombs, also known as Hammer). The Armée de l'Air opted to use a lightened Mk82 bomb body (with an explosive weight reduced from 192 to 29lb [87 to 13kg]) in order to provide improved characteristics for strikes in urban areas. The lightened Mk82 is primarily used in combination with a laser-guided AASM kit (SBU-54). "We have even used the Mk82 without any explosive on board" one Armée de l'Air expert explained, with concrete replacing the explosive content. This approach was primarily used during the Libyan War in 2011. A pair of Rafales often flies with AASM on one aircraft, and GBU-12 on the other, in order to give the JTAC the widest spectrum of possible actions. Sometimes, the GPS signal is of poor quality, making the GBU-12 the preferred option. Other times, the dust, sand and smoke from previous strikes will mask the laser signal, making the GPS-guided AASM the best course of action. "If the JTAC on the ground only wants GPS-guided ordnance and I only have GBU-12 on board, I move to another task," one French pilot in Jordan told *AFM*. "There is no lack of jobs for fighters!"



Above: AASMs prepared for delivery to Rafales. This weapon, which combines the attributes of a guided bomb and a missile, can hit a target at a range in excess of 34 miles.





Above: The US-developed 2,000lb GBU-24 LGB is used to destroy larger targets. During AFM's visit two examples were employed to destroy a bridge in the Raqqa area. **Left:** A two-seat Rafale B from Escadron de Chasse 1/4 'Gascogne' returns from a night mission. On this occasion, all of the GBU-24s launched hit their target – a bridge. **Below:** Rafale C 128 '4-GG' leaves Jordan for a close air support mission, hundreds of kilometres away. GBU-12s are less costly than the French-made AASM, but they can be hampered by the smoke screens created by IS for protection against detection and air strikes.



Below: French Rafales use 2,000lb and 1,000lb class bombs, as well as 500lb Mk82 bomb bodies carrying a lightened load of explosive. Rafale C 109 '30-IM' carries a brace of 500lb GBU-12s under each wing.



Navy SOF) and the air force's Commando Parachutiste de l'Air No 10 (CPA 10). These collect human intelligence, but also work as air-land integration nodes with the Rafales. The operatives from CPA 10 also have the capacity to collect satellite imagery for the task force, and can gather biometric prints from dead jihadists. The air force unit also uses mini- and micro-drones such as the Elbit Systems Skylark, Prox Dynamics Black Hornet and undisclosed commercially available unmanned aerial vehicles – possibly including the DJI Phantom.

In the sky, an E-3F AWACS outfitted with electronic support measures (ESM) equipment and veteran C-135FR in-flight refuelling tankers also help sustain the Chammal and wider Operation Inherent Resolve order of battle.

Armée de l'Air transports form part of the air bridge between France and Jordan, where 30% of the total freight arrives by aircraft. The A400M Atlas is a valuable workhorse for the forward-based Rafales, and in a matter of hours can fly in Damocles targeting pods, bombs and spare parts.

The Jordanian base is home to 400 French military personnel. This is sufficient to sustain a 'surge' in operations, first executed in November 2015 after the terrorist attacks in Paris. The then President François Hollande called upon the Armée de l'Air to launch two waves of strikes, which were completed in the space of a few hours.

This April, the air force Rafales were joined in Jordan by four Rafale Ms from the Aéronavale (French Naval Aviation). These initially flew from the base for a four-month period. A second naval Rafale deployment is taking place between October and November. The Aéronavale presence at the base is completed by the Atlantique 2, which has been deployed in Jordan since February 2016. The ATL 2 is used both as an intelligence asset and as a strike platform, armed with GBU-12 and 250lb (113kg) GBU-58 Paveway II LGBs (see *Overworked Atlantique 2*, September, p57-59). **AFM**

Around the start of the new millennium, the Belgian Air Component and France's Armée de l'Air both began to re-evaluate their jet pilot training needs and reorganise their assets.

Belgium had introduced budgetary cutbacks, and overall reductions to the force saw the disbandment of several frontline fighter units. But its pilot training structure, based at Beauvechain, still operated some 29 recently modernised Alpha Jet 1B+ advanced jet trainers. Their update had included a cockpit modernisation, making it more suitable for training future F-16AM pilots.

But with its requirements for new fighter

pilots shrinking year on year, Belgium would soon have a modern but oversized jet trainer fleet, consuming much of its annual military aviation operating budget.

Although the Armée de l'Air was also gradually reducing its operational fighter units, it was still in continuous need of new tactical jet pilots to fly the Rafale.

Its lead-in squadrons with the École de Transition Opérationnelle – at Base Aérienne (BA) 120 'Commandant Marzac', or Cazaux air base – were responsible for Phase IV flying training for young, newly graduated students. However, they still operated 1970s-era Alpha Jets with analogue cockpits.

To address the technology gap between Cazaux's Alpha Jets and the Rafale, the Armée de l'Air could either invest in an upgrade similar to Belgium's or look to collaborate with the Belgian Air Component and make use of its additional Alpha Jet capacity.

The resulting bi-national training programme – the Advanced Jet Training School (AJeTS) – transferred all Belgian jet pilot training to France, and quickly yielded much needed financial and tactical economies of scale.

The AJeTS contract signed by the Belgian and French defence ministers on April 21, 2004 was valid for 14 years. Belgian



Main image: Operating out of BA 120 Cazaux, Belgian Alpha Jet 1B+ aircraft are used by Belgian and French instructors to train their new combat pilots. Inset right: A French instructor pilot at work. The decrease in the number of Belgian IPs assigned to ETO 2/8 will be compensated for by an influx of additional experienced Armée de l'Air pilots, mostly from the Mirage 2000C or 2000N communities. All photos Stefan Degraef



Belgian-French jet training connection

At the end of next year the last Belgian Air Component jet pilot students will complete their training with ETO 2/8 'Nice' at Cazaux in southwest France. **Stefan Degraef** appraises the bi-national Advanced Jet Training School.



student pilots would undergo their initial (Phase III) jet training at BA 705 Tours, home of the Armée de l'Air's École de l'Aviation de Chasse (EAC) 314, before heading to Cazaux for their Phase IV course and from then on flying Belgian Alpha Jets.

Bi-national management

Various workgroups (Groupes de Travail, GTs) were created to manage the AJeTS, and a bi-national general meeting is attended each May by the chiefs-of-staff of the Armée de l'Air and Belgian Air Component to assess and evaluate the AJeTS and modify it if needed.

Detailed planning has been required to keep the available fleet operational. Since both air forces had received Alpha Jets in the late 1970s, and the aircraft is long out of production, continuous bi-national management ensures the supply of spare parts doesn't become critical.

In early 2000, Belgium was still operating 29 of its original 33 Alpha Jets, enabling rotation of available aircraft to manage fatigue on their airframes and components and extend their individual service lives.

From the start, both air forces agreed to use as much of their joint stocks of spares as possible and – if needed – to cross-fit various items (undercarriage, wings) to reduce overhaul costs. For financial reasons Belgian Alpha Jets are equipped with 'French' engines – which have more flying time left. French support contracts are used instead of paying for maintenance of the original Belgian engines, which are stored in optimal conditions in Belgium and just require overhaul to become airworthy again.

The switch to 'French' spare parts and engines has allowed the Belgian Alpha Jets – vital for Phase IV instruction – to

remain operational and succeed the required aircraft availability at all times. They serve together with 20 updated French aircraft. From 2011 onwards, Belgium ordered an overhaul and upgrade of its 'old' wings before re-fitting them to the Belgian airframes. Some 'typical Belgian' components (ejection seats, head-up display [HUD], inertial navigation system, UHF/VHF radio) are sent for repair and overhaul at the 1st Wing at Beauvechain, or to other Belgian military units or civilian sub-contractors.

The first major change for the AJeTS came in March 2013 when the Belgians decided on a single-base concept, relocating Phase IIB/III initial jet training from Tours to Cazaux. Beginning that September, all Belgian students, having graduated from Phase II training on the SF260M at Beauvechain, were trained on their own Alpha Jet 1B+ fleet by Escadron de Transition Opérationnelle (ETO) 2/8 'Nice' instead of the 'older' Alpha Jet Es of the Armée de l'Air.

This move triggered a transfer of three Belgian Phase IIB/III instructors to ETO 2/8 as well as a revision in the financial payment balance between the two air forces. ▣





Above: Alpha Jet 1B+ serial AT25 (c/n B25/1110) over the coast of southwest France. The Belgian Alpha Jet 1B+ aircraft were updated for use as 'elementary' lead-in trainers for the Belgium Air Component's F-16AMs. **Below right:** An Alpha Jet two-ship during a training sortie from Cazaux. In 2019 the return of the last Alpha Jet and associated technicians will mark the end of the Belgian presence at Cazaux and the conclusion of the successful bi-national AJeTS initiative. **Bottom left:** The front cockpit of an Alpha Jet 1B+. The updated avionics of the Belgian Alpha Jets enable the aircrew to 'tape' all HUD data (using F-16 symbology) for post-flight debriefing.

French student pilots remained at the Tours-based EAC 314 for Phase III instruction before transfer to ETO 1/8 'Saintogne' or ETO 2/8 'Nice' at Cazaux for Phase IV training on the Belgian Alpha Jet 1B+ and the updated French Alpha Jets.

On arrival at Cazaux, French students go through a brief conversion course on the updated jets (four simulator and four live flying missions) to familiarise them with the new avionics and HUD.

The division of French students between both squadrons depends on availability in the units and the various students' English language knowledge. A small number of foreign pilots from non-NATO air arms (Cameroon, Saudi Arabia and, from next year, Kuwait) are also regularly trained by ETO 1/8, without being allowed to use the Belgian airframes.

Training the next generation

On average, six to eight pilots from Belgium will arrive at Cazaux each year to start their Basic Jet Training (BJT) course (Phase IIB) on the Belgian Alpha Jets. Over four months



the students will fly 22 training missions (CT01-22) and four using Cazaux's Alpha Jet flight simulator – the BJT course including formation and elementary navigation flying.

At the end of the course all students are screened and streamed onto the fixed- (jet or multi-engine/transport) or rotary-wing tracks, depending on their individual piloting skills and operational requirements in the various units of the Belgian Air Component. Jet-streamed students remain at ETO 2/8 and begin their Advanced Flying Training (AFT, or Phase III).

The AFT module (19 missions) teaches advanced navigation techniques by introducing certain tactical elements, requiring students to assess situations independently and as accurately as possible.

Correct map reading and 'on track, on time' flying is vital to succeed in this demanding module, during which a maximum of 10% of training flights are flown as solo pilot, assisted by an IP (instructor pilot) flying in close proximity. Formation work is meanwhile

expanded from two- to four-ship flying.

Additional simulator missions are used to acquaint students with air-to-ground attack profiles in anticipation of ETO 2/8's final Initial Operational Training (IOT) module (Phase IV).

Most of the training flights during the BJT and AFT modules are flown over southwest France, using the region's military air bases and civilian airports as training destinations and, in case of weather or technical issues, diversions. They include Avord, Biarritz, Bordeaux-Mérignac, Bergerac, Cognac and Mont-de-Marsan as well as Tours. During these training flights the ETO 2/8 Alpha Jet aircrew use 'Robin XX' callsigns.

In Phase IIB/III, Belgian students are instructed exclusively by their own nation's instructors on Belgian Alpha Jets – French students remaining at EAC 314 Tours for their initial jet training modules.

As of this year, six Belgian, six French, one German and one Italian IP are staffing ETO 2/8. Future Belgian instructors, mostly experienced frontline F-16AM

From the cockpit: air-to-ground training

Cazaux air base, earlier this year. Four Belgian Air Component Alpha Jets (callsigns 'Ricquet 51-54') leave the ETO 2/8 'Nice' apron and head for runway 06.

They line up on the runway, crewed by two experienced Belgian and French instructor pilots flying in 1 and 3 positions in the formation, and two Belgian students, soon to graduate. Before take-off, the final engine and handling checks are executed as briefed.

At the exact pre-briefed time, 'Ricquet 51', an experienced former F-16AM pilot, starts his take-off run, followed soon after by his wingman. A French captain with considerable EC 2/4 'Lafayette' Mirage 2000N experience leads the remaining duo.

Once the four are airborne and have joined up in their pre-briefed positions, 'R51' will give the 'push' call by accelerating to 420kts and descending to 500ft (152m) to begin the low-level navigation and air-to-ground mission. Within seconds of the call the four-ship spreads laterally and vertically into a standard tactical formation.

For 'R52' and 'R54' this is the final mission within Cazaux's Phase IV course. The two instructors will closely monitor and evaluate all their flying and tactical capabilities, including navigational accuracy, radio communications and attack profile.

To increase the tactical value of the mission, all radio calls cease well before the first target. Instead, visual 'wing movement' inputs are used to communicate between the lead pilots and their wingmen, especially when flying over the initial point.

Having crossed his initial point for the attack run at precisely the correct time, 'R51' turns violently into the target before starting his 'pop-up' and roll-in for a high-angle dive-attack. The target is a large depot at Sauveterre-la-Lémance in Lot-et-Garonne.

After bombs release, he turns violently away from the target during his 'escape' manoeuvre. His 'leader' attack sequence is closely monitored and timed by his wingman, who will attack the same target from a different relative position and angle.

Special care is taken in the split-second timing of the attack. Arriving too early over the target area may inflict lethal damage on his aircraft from debris from exploding bombs dropped by 'R51'. Being too late may well trigger unwanted attention from defending anti-aircraft defences.

Once 'R54' makes the 'touchdown' call indicating the successful execution of the attack, the four-ship formation heads for the second target. After repeating the same tactical procedure, the jets return to Cazaux.

Within minutes of engine shutdown, all four pilots debrief the overall flying and tactical aspects and results of the mission. Each instructor and student will then separately debrief in depth about the student's specific actions during a face-to-face discussion using the onboard gun-camera video.

Two weeks later both young pilots successfully graduated from the Phase IV course at Cazaux and headed home to Belgium to begin their F-16AM training course at Kleine Brogel, home of the F-16 OCU.

pilots, undergo a 25-mission course with EC 8's STANEVAL (standardisation and evaluation) unit based at Cazaux.

During its two-month syllabus they are briefed by Belgian and French IPs on how to train young aircrew, and live flying missions are flown from the front and back seats. For safety reasons, and because of the limited forward view from the rear cockpit, IPs in training – who use the 'Razzia XX' callsign – need to be able to land an Alpha Jet using the front-seat HUD repeater on the instrument panel.

At first there was no specific technical course for the Alpha Jet for IP students because all Belgian pilots had gone through their initial training on the same aircraft type during their original pilot training. Today, however, a one-week course on all technical aspects of the type is provided by the Tours-based Unité d'Instruction Spécialisée (UIC). It's also given to new Belgian student pilots prior to beginning jet training at Cazaux.

Initially streamed as Phase IIB/III or IV instructors, a gradual decline in Belgian pilots assigned to ETO 2/8 means all IPs are now required to be able to deliver all modules if needed. This can be useful if the training schedule for new pilots needs to be accelerated – for example, owing to poor weather.

Student pilots to young guns

Training of young jet pilots at ETO 2/8 ends with the demanding IOT, or Phase IV, module when they learn to employ the Alpha Jet as a combat aircraft.

Over a training course of 32 to 36 weeks, French and Belgian instructors teach students the art of air-to-air and air-to-ground tactics. Owing to the financial structure of the AJeTS, Belgian students are not allowed to fly French Alpha Jets.

The IOT module kicks off with the

fundamentals of air-to-air warfare. During basic fighter manoeuvres (BFM) and subsequent advanced combat manoeuvres (ACM) missions, students are taught air combat in 1-v-1 or 2-v-1 scenarios. Most air-to-air combat and interception missions are flown over the nearby Bay of Biscay, using strict safety regulations including minimum altitude and 'bubble' separation between aircraft.

To prepare the students for their future postings, all tactical communication is executed using F-16 tactical terminology. The updated avionics of the Belgian Alpha Jets enable aircrew to record all HUD data (using F-16 symbology) for post-flight debriefing.

All Phase IV tactical air-to-ground missions (navigation and simulated ground attack) are flown using 'Ricquet XX' callsigns at

low or medium level in two-ship and, later, four-ship formations, with the students acting as wingmen. To optimise instruction in each flying hour, one student will fly solo while another monitors the mission and digests the information provided by the instructor in the back seat.

For air-to-ground gunnery, students and instructors use the Armée de l'Air's Captieux firing range, 35nm from BA 188 Mont-de-Marsan. Training stores comprise lightweight BDU-33 bomblets and smoke-producing non-exploding 30mm projectiles, fired from a centreline-mounted single-barrel cannon pod.

The methods used to deliver this ordnance are standard high-angle and air-to-ground attack and strafing profiles. The Cazaux-based IOT squadrons are not permitted to use the nearby



Above: A Belgian crew in their cockpits. The number of Belgian instructor pilots at Cazaux is gradually decreasing and the final Belgian jet students will graduate from ETO 2/8 at the end of next year.

Calamar firing range, which is exclusively reserved for the locally based Centre d'Evaluation de Vol (CEV) flight test unit.

Traditionally, instructors use four large railway and A10 highway bridges over the Dordogne River, close to Bordeaux, to instruct the basics of air-to-ground attacks against static targets.

Both air-to-air and air-to-ground modules can be delivered simultaneously to ETO 1/8 and 2/8 students to prevent having to continuously arm and de-arm the available Alpha Jets, depending on the individual progress of the students.

The IOT phase ends with more complex and combined missions during the advanced module, requiring students to put all their experience and tactical knowledge into action. Ground-attack and close air support missions are flown using NATO procedures against dynamic targets marked by Belgian forward air controllers positioned in an 'area of responsibility', while a pre-planned tactical navigation mission may well be interrupted by a 1-v-1 air-to-air combat 'skirmish'.

Belgian Phase IV students also 'deploy'



Above: Instructor and student pose in front of their mount. In February 2017 the decision was taken to send future Belgian jet students (and some IPs) to the Euro-NATO Joint Jet Pilot Training scheme at Sheppard AFB in Texas.

Below: During Phase IIB/III Belgian students are instructed exclusively by Belgian IPs on Belgian Alpha Jets, since French students remain with EAC 314 at Tours for their initial jet pilot training modules. This aircraft received special camouflage commemorating 35 years of the Alpha Jet and ten years of AJeTS.



Above: In March 2013 the Belgian Air Component decided on a 'single-base' concept and relocated the Phase IIB/III initial jet pilot training for its national students from Tours to Cazaux.

to Beauvechain for a two-week F-16 Preparation Module, when they execute instructor-assisted 2-v-1 dissimilar air combat training (DACT) against F-16AMs.

A continuous dialogue with, and feedback from, the Kleine Brogel-based F-16AM Operational Conversion Unit (OCU) is vital to guarantee the required high standard of 'flying and thinking' among the new fighter pilots graduating from ETO 2/8. Based on this consultation, minor modifications are implemented in the training modules for the Belgian students at Cazaux if needed.

What next?

The bilateral AJeTS programme will come to an end on January 1, 2019, in anticipation of which the Belgian Air Component began to look for alternatives.

The Belgium-based jet training structure no longer existed and there was no intention to re-establish it at Beauvechain, so the air force has been forced to look beyond Belgium and join a multinational training programme, conducting consultations and evaluating various options with an aim to provide

affordable training for six to ten jet pilots a year while meeting strict NATO-compliant quality criteria.

In February this year the decision was taken to send jet students (and some IPs) to the Euro-NATO Joint Jet Pilot Training (ENJJPT) 'pilot factory' at Sheppard Air Force Base in Texas.

In previous decades the Belgian Air Component sent a limited number of pilots to ENJJPT while still participating in its own Alpha Jet-based jet pilot training structure at Sint-Truiden/Brustem and later at Beauvechain.

Belgium has been gradually reducing its number of IPs at Cazaux, with three due to train there next year. Its last jet students will graduate from ETO 2/8 at the end of 2018.

Around 15 operational Alpha Jet 1B+ trainers will remain at Cazaux – used exclusively by French students and IPs of the two ETO squadrons – pending their final withdrawal and gradual return to Belgium by late 2019. **AFM**



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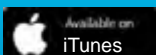


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Above: A Royal Air Force Typhoon pilot completes pre-flight checks against the unmistakable backdrop of Nellis Air Force Base, Nevada at the height of a Red Flag exercise. The Flag series of exercises continues to offer some of the world's most realistic air combat training. Jamie Hunter **Below:** A US Air Force A-10 instructor pilot demonstrates a full-motion simulator at Davis-Monthan Air Force Base, Arizona. This equipment presents an accurate cockpit with a simulated 360-degree view to provide instrument and combat training for new and experienced pilots. USAF/Airman Nathan H Barbour



We have seen recently that commentators often focus on defence equipment as a measure of capability, while one of the most vital elements often goes largely unnoticed. Much worse, when budgets are tight, this same tendency means that equipment programmes tend to grab all the headlines and the lion's share of the budget.

However, in my personal experience, the frequency, quality and realism of its operational readiness training is the most critical element of an air force's air power capability.


There are some notable examples of the highest-quality air training, and perhaps the most famous and best is the Flag series of exercises held in the deserts of Nevada and based out of Nellis Air Force Base, of which Red Flag is the best known.

Here, many dozens of aircraft fly in simulated missions against a very sophisticated and realistic



War games or gamers?

Air Power Association President **Air Marshal (Ret'd) Greg Bagwell CB CBE** looks at the challenges of providing future frontline pilots with operational readiness training that meets the demands of fifth-generation fighters.



A pilot from No 29 (Reserve) Squadron – the RAF's Typhoon Operational Conversion Unit – scans the sky from the front seat of a Typhoon T3 as a pair of jets heads out for training. A new pilot's first sortie in the Typhoon is no longer flown in the two-seater.
Jamie Hunter

threat environment, and it is the nearest thing to real air combat anyone can experience outside of a war zone.

The concept is simple – if you can get aircrew through their first ten mock combat sorties safely, then their effectiveness and life expectancy in real combat increases exponentially. Modern warfare is brutal and will not provide many chances to learn on the job, so aircrew have to be at peak performance from the very first sortie.

However, even exercises like these have their limitations and air forces are using new technologies and methods to enhance their operational training.

Air forces are now looking to use sophisticated live and virtual training, and sometimes a combination of the two in what is known as constructive training, using real and simulated 'enemies'. The Royal Air Force has set a goal of 50% live and

50% virtual education for all aircraft types. Although this has not been adopted universally and remains scientifically untested, the service is now committed to achieving this goal.

Other air forces will be watching with great interest and budget managers will be sharpening their pencils. But what began as a savings exercise is beginning to look more appealing for other reasons too, especially as simulation technology and software improves beyond all recognition.

The use of virtual training is very attractive for a number of factors: it reduces costs and wear and tear on the real aircraft fleet, it takes tuition away from prying eyes and it can expose crews to very realistic scenarios and representative threats, including full and realistic weapon engagements.

It also has some limitations, however: above all, its lack of real danger or consequences

means that crews may not act as they would 'in real life', and it does not test the end-to-end systems of the actual aircraft.

In my personal experience nothing creates more adrenaline than flying your real aircraft into a merge at a closing speed of over 1,000mph with no reset button – no simulation generates quite the same buzz or pressure (knowing that the Red Flag debrief is in front of about 200 of your peers also concentrates the mind a little).

The RAF has already moved much of its basic Typhoon training into the simulator – indeed, a brand-new Typhoon pilot's first sortie in the aircraft will be their first solo mission; and with there being no dual-seat variant of the F-35, this type of indoctrination has been built in from the outset on the Lightning II.

It's worth considering that this is the equivalent of a 17-year-old being allowed to drive in a

"In my personal experience nothing creates more adrenaline than flying your real aircraft into a merge at a closing speed of over 1,000mph with no reset button."

Formula One race after a few weeks of driving simulation with no licence – hopefully driverless cars will become the norm first!

However, the reason for this shift isn't just simple cost (indeed, an aircraft's full-mission simulator can cost as much if not more than the real thing). With the advent of fly-by-wire, the basic handling of

Right: The capabilities of fifth-generation types, such as these F-35 Lightning IIs, are putting growing pressure on operational readiness training. While virtual training is increasingly taking a share of the burden, the need for live training – and traditional Red Air assets – remains critical. *Jamie Hunter*

Below: Despite the age of its A-4s, Draken International can employ complex and aggressive tactics to provide a credible Red Air threat to frontline types during Red Flag. A typical exercise may involve 24 Red Air jets, with regeneration allowing that number to increase by three or four times during each 'vulnerability period'. *Jamie Hunter*



an aircraft has become simpler and less risky – monitoring and warning systems and significant pilot assistance makes learning how to fly it much easier. However, with more complex mission systems and sensors and increased weapons ranges, learning how to operate the aircraft has become a far more complicated and lengthy process.

It is here that the simulator wins hands down – from the safety of your own home (base) you can fly in any environment

and against any number or type of foe. And you can do it over and over again until your response is perfect before practising something similar in the air – no first live mission should ever be a mystery again.

An essential part of any operational training is the 'creation' of an enemy. While some of this can be done through algorithms in the synthetic and constructive environment, it still needs to be applied with human actors who can control the learning

input and outcomes and provide or facilitate the all-important debrief after any training event.

These are colloquially known as the White Force and their role is to act like games masters and umpires to ensure that learning objectives are met.

In the live environment a different approach is required in order to create an enemy force. Traditionally, units or sections took it in turns to provide Red Air but some air forces have created full-time 'aggressor' squadrons who have

been trained in enemy tactics and thinking in order to create as realistic a foe as possible.

This includes flying dissimilar aircraft types sometimes camouflaged differently. The illusion is completed by aggressor crews wearing 'enemy' patches and maintaining a certain aloof aura befitting an elite unit. Increasingly, however, the use of military and pilot assets to fulfil this role has become a costly and unnecessary burden on military resources.

Now, a number of companies offer a commercial Red Air capability. These are able to replicate a sophisticated threat for a much-reduced cost through the use of high-performance (but older and cheaper) aircraft alongside other civilian aircraft that are modified to emulate threat systems and signatures.

It is clear that air forces can't afford to under-invest in this area, nor can they take too many risks on the quality of their groundwork.

A shiny new air force with poor training is not an air force – we have all seen someone turn up to play a sport with all the latest equipment and clothing only to demonstrate their lack of talent. After all, nobody wants to be in combat 'with all the gear and no idea'. **AFM**



Simulators allow pilots to practise their skills repeatedly before putting them to the test in real life – especially important in the hazardous carrier deck environment. British pilots are preparing to fly the F-35B from Royal Navy aircraft carriers using a £2m simulator with 360-degree immersive capability. *BAE Systems*

NEXT MONTH:

Unpicking the anti-access/area denial threat.

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DECEMBER ISSUE FEATURES:**PROWLER'S LAST CRUSADE**

The Marine Corps' Grumman EA-6B Prowler fleet may be old and nearing retirement, but with just two squadrons remaining, it's still in demand. As VMAQ-2 'Death Jesters' participates in the Weapons and Tactics Instructor course at MCAS Yuma, Arizona, for the last time, Jamie Hunter and Rich Cooper look at the final chapter of the Prowler.

ELECTRIC VIKINGS

Naval Air Station Whidbey Island in Washington State may not receive the attention of some of the more renowned Master Jet Bases, but it is equally important as the home of the naval electronic attack community. Erik Bruijns and Mark de Greeuw meet EA-18G training unit VAO-129 'Vikings'.

HEROES IN TRAINING: PART ONE

Rich Cooper embeds with the US Navy's Training Air Wing One at NAS Meridian, Mississippi, to report on the process of training future naval aviators and hear how the service is coping with the T-45's challenges at a hard time for the community.

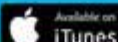
UNMANNED AMBITION

The countdown is on for the US Navy to field its first operational carrier-based unmanned aerial vehicle, the MQ-25 Stingray. Its first job will be to refuel other carrier aircraft. Robert Beckhusen explores the complicated legacy behind one of the MQ-25 contenders: the Northrop Grumman X-47B.

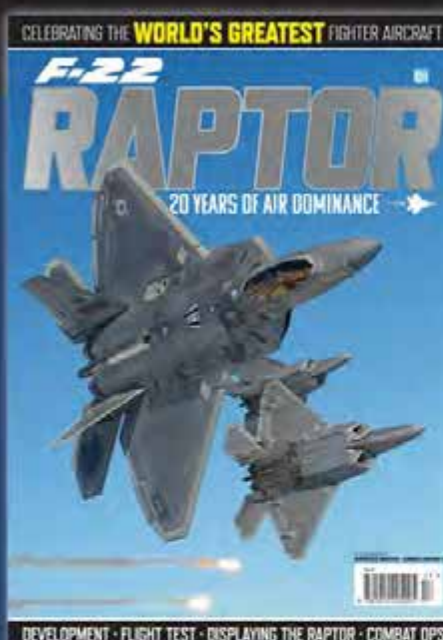
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Rotary reshuffle f

The Royal Thai Police Aviation Division is undergoing modernisation, with several helicopter types being replaced, writes **Dino van Doorn**.

Above: Bell 429 3202 (c/n 57290, ex N781FB) was one of four examples active at Ram Inthra in August.
Below: Hoist-equipped AS365N3+ 3002 (c/n 7008, ex F-WTCH) is one of two Dauphins that were operational at Ram Inthra in August.
All photos Dino van Doorn

New helicopters are being introduced to the Royal Thai Police (RTP) Aviation Division based at Ram Inthra Police Airport in the Tha Raeng district of eastern Bangkok. The airfield offers a short concrete runway, hardstandings and three large hangars; two of the latter were recently renewed under the same modernisation programme.

The RTP Aviation Division comprises two aviation wings – fixed- and rotary-wing. The latter includes a variety of helicopters, with

Time is surely running out for Bell 206B-2 2306 (c/n 1902, ex 9V-BHU), the sole active JetRanger at the base. In the background is the cabin of Bell 205A-1 1731 (c/n 30302, ex N2774Y).





or RTP



Bell 412EPi 2611 (c/n 37008, ex N549/Q) is one of two new examples that were delivered to the RTP in the first week of August.

older airframes dumped beside the landing pads and harvested for spare parts – its Bell 205s and UH-1Hs having now been withdrawn from use. Two veteran Bells, a 206L-1 and a 206B-2, remain airworthy alongside a single 212, the rest of the RTP fleet comprising more modern types.

Among them, four new Bell 429s and two new Bell 412s were operational at the time of *AFM*'s visit in August, as well as two AS365N3+ Dauphins, three EC155B-1s and several Bell 412EPs (which lack the 412EPi's glass cockpit).

Speaking at Ram Inthra in August, the RTP Aviation Division's commander-in-chief said: "Our old Bell 206B-2 and UH-1H helicopters had been in service for many years and did an excellent job, but needed to be replaced with state-of-the-art hardware, which we have in the Bell 429 and Bell 412EPi."

Although the fleet's primary mission is VIP transport, its AS365N3+ aircraft

are equipped for search and rescue (SAR) with an electric hoist, rappelling gear, a cargo sling and searchlights.

During the first week of August two new Bell 412EPis – serial 2610 (c/n 37007) and serial 2611 (c/n 37008) – were delivered along with the RTP's final 429 model (serial 3204).

The two 412EPis flew multiple circuits at Ram Inthra during the second week of the month, with US pilots flying them under the type's certification programme for RTP service.

More new equipment had arrived by October 3, when Airbus Helicopters announced the RTP had become the first H175 operator in the Asia Pacific region: the force received two, which will be used for VVIP transport as well as police missions.

In a statement, Airbus noted that the RTP also operates five H155 (EC155B-1) and two AS365N3+ helicopters – although only three EC155B-1s were noted at Ram Inthra in August, one of which was stored. **AFM**



RTP helicopters at Ram Inthra, August 2017

Type	Serial	Remarks
Bell 212	2220	
Bell 412EP	2605	
Bell 412EP	2606	
Bell 412EP	2608	
Bell 412EPi	2610	
Bell 412EPi	2611	
AS365N3+	3001	
AS365N3+	3002	
Bell 206B-2	2302	Dumped
Bell 206B-2	2304	Dumped
Bell 206B-2	2305	Dumped, no tail
Bell 206B-2	2306	Sole active example
Bell 206B-2	2307	Dumped
Bell 206B-2	2308	Dumped
Bell 206B-2	2310	Dumped
Bell 206B-2	2311	Dumped
Bell 206B-2	2312	Dumped
Bell 206B-2	2313	Dumped
Bell 206L-1	2401	Dumped
Bell 206L-1	2402	Sole active example
Bell 429	3202	
Bell 429	3204	
Bell 429	3205	
Bell 429	3206	
EC155B-1	2901	
EC155B-1	2902	Stored
EC155B-1	2905	
UH-1H	1710	Dumped
Bell 205A-1	1713	Dumped
Bell 205A-1	1718	Dumped
Bell 205A-1	1724	Dumped
Bell 205A-1	1731	Dumped
Bell 205A-1	1732	Dumped

The Luftwaffe's Fighter Weapons School is becoming established at Laage air base in northeast Germany. **Stefan Petersen** discovered how the school provides demanding training for top Eurofighter pilots and support personnel.

Fight to win



Main image: Eurofighters dispense flares in the training area over the Baltic Sea during WIC 03/17. All photos Stefan Petersen unless otherwise stated. **Above:** Obstdt Gero von Fritschen, the commanding officer of TaktLwG 73 'S' in front of one of his wing's Eurofighters. TaktLwG 73 'S'

Two-versus-two is the game plan for today. A pair of Luftwaffe Eurofighter EF2000s will be led by a Weapons Instructor Course (WIC) 'undergraduate' – as the course students are called – Hauptmann (Hptm/Capt) Steffen 'H'.

They will be up against two more Eurofighters, one of which will be flown by Oberstleutnant (Obstdt, Lt Col) Julius 'K', the boss of the WIC. As leader of the Red Air element, he will do his best to make it as difficult as possible for the young pilots in the training area over the Baltic.

This is WIC 03/17, in which German Eurofighter pilots train together with Luftwaffe ground control intercept (GCI) and intelligence officers in what is a highly specialised and demanding course.

"We are very strict: only the best are accepted for this training," says Obstdt 'K'. For a start, all pilots must have combat-ready status. "If they're instructor pilots, too – great, but that's not one of our requirements."

The Luftwaffe's new weapons school is still being built up with Taktisches Luftwaffengeschwader 73 'Steinhoff' (TaktLwG 73 'S', Tactical Air Force Wing 73) at Laage. After a detailed survey of all potential locations, in July the decision was taken to conduct the WIC at the former East German air base.

"An interim structure already existed at Laage and so the final development will be easier to accomplish here than at other air bases," says Obstdt Gero von Fritschen, commanding officer of TaktLwG 73 'S'.

"Since the tasks will become increasingly complex as the course develops, the demands for airspace, infrastructure and support will grow too. We can best provide that here

at Laage, where the Eurofighter weapons system training effort is also located."

Undergraduates under fire

Hptm Steffen 'H' briefs all details of the mission. This will be a set-up of medium complexity – to reflect the current phase of the course, which is divided into three blocks.

After a theoretical introduction for the seven undergraduates – three pilots, three fighter controllers (who work in control and reporting centres [CRCs] or aboard E-3A AWACS early warning aircraft) and one intelligence officer – the flying phase starts. This is all about tactics, and is accompanied by theoretical lessons and plenty of simulator rides.

"We start by training dogfights one-versus-one and increase to two-versus-one and then two-versus-X," Obstdt 'K' explains.

"Then the scenarios are expanded to medium range – and up to four-versus-X."

Missions are also flown in IFR (instrument flight rules) conditions, in bad weather and at night as well as under electronic warfare measures. At the end of the tactics phase the EF2000 pilots will also face simulated threats from ground-based air defence systems.

The non-flying undergraduates (GCI, AWACS) support the pilots. "We bring together the key personnel for combined air warfare operations to plan, brief, fly and then thoroughly debrief the mission face-to-face," says Obstdt 'K'.

In real life, these different professions will all have to work together seamlessly in locations that may be very distant from each other.

The third and final part of the WIC is the mission employment phase, which for WIC ►





The WIC 'undergraduates' also have to train to win aerial engagements at night.

03/17 coincided with the Royal Air Force's Typhoon Weapons Instructor Course at RAF Coningsby, Lincolnshire – as it had for the first Luftwaffe WIC course of this kind in 2016.

Obstlt 'K' explains: "During this three-week exercise, named Cobra Warrior, the undergraduates have to master the employment of large groups of different aircraft types – so-called COMAOs, or combined air operations. Everything takes part: British Typhoons, German Tornados, AWACS, tankers and more."

For Obstlt von Fritschen, the commanding officer of TaktLwG 73 'S', this kind of co-operation is an essential part of the course: "Resources for such complex scenarios can only be provided on a multinational basis," he says.

"On the Red Air side, other fighter types have to be utilised beside the Eurofighters. When we synchronise with other nations at such a high level, we also benefit from the positive effects for tactical and technical co-operation in the future."

Back to today's mission, and the four EF2000s have arrived in the airspace

over the Baltic. Here they're permitted to drop flares and go supersonic.

All the capabilities of the Eurofighter weapons system are employed for WIC missions. Most pilots wear the Helmet-Mounted Symbology System (HMSS). Weighing less than two kilos, the carbon-fibre helmet provides the pilot with all relevant flight and weapons parameters, which are displayed directly on the visor.

Obstlt 'K' described the HMSS as "a great support to retaining situational awareness during combat". Three sensors – one on each side of the cockpit and one on top of the ejection seat – track the pilot's head movements so the aircraft always knows where they're looking and what they're aiming at.

Hptm Steffen 'H' stares intently at the number two Eurofighter in the Red Air section. The hostile jet is just at the maximum range for his infrared-guided IRIS-T air-to-air missiles. His intention is to identify and neutralise this enemy on the first attempt and gain numerical superiority for the rest of the simulated fight.

"Fox 2!" The undergraduate pilot calls the code for weapons release to his wingman. He's sure he has a hit, so they can both now concentrate on the Red Air leader.

"We don't play games on the map table," Obstlt 'K' explains. "We have the jets in the air and we conduct the mission as close to reality as possible. We then painstakingly analyse the execution."

Subject matter experts

The fully trained weapons instructors will serve within their squadrons as multipliers and tactics experts who not only plan and lead complex air combat missions but also provide advice to the military leadership – and give their fellow pilots a better understanding of the assets utilised.

Von Fritschen continues: "We need personnel with top knowledge and the highest level of flying proficiency to play an important part in the development of future weapons systems. They must be able to develop and assess future threat scenarios and use their conclusions as the basis for the necessary decisions."



Above: A Flight Profile Recorder (left) and IRIS-T air-to-air missile acquisition round are the main tools for every WIC mission. **Right:** WIC Eurofighters are readied for another training mission at Laage air base.





Above: A head-on view of a WIC Eurofighter seen from the open ramp of a Luftwaffe C-160D Transall. **Right:** Most of the training missions for WIC 03/17 were conducted over the Baltic Sea. **Below:** A WIC Eurofighter pilot wearing the Helmet-Mounted Symbology System (HMSS) waits for take-off.



Hptm 'H', Obstlt 'K' and the other two pilots in today's mission meet up for the multi-hour debriefing session. All aspects of the flight are talked through, down to the finest detail, the Flight Profile Recorders (FPRs) under the wing of each of the jets having tracked every aircraft movement.

"You can't whitewash anything here," says Obstlt 'K'. The young captain has to accept that his first IRIS-T shot was ineffective. "Incorrect estimate in the air," he admits.

Meanwhile Obstlt 'K' takes notes. As a weapons instructor he not only has to be at the top of his game in air combat but must also be able to communicate his skills.

At the end of the debrief, the results of the engagement are presented on the board. No 'kill' was achieved this time, but there's a tick beside the first and most important point: 'survive'.

Only those who 'survive' the test are able to proceed. It's a reality reflected in the motto of the Fighter Weapons School, displayed in large letters on the wall: 'Fight to fly, fly to fight, fight to win.' **AFM**



Report released into DC ANG F-16C crash



Above: The wreckage of USAF F-16C 87-0306 'DC' of the 121st Fighter Squadron in woods near Joint Base Andrews, Maryland, following its crash on April 5, 2017. USAF

A US Air Force Accident Investigation Board (AIB) report into the crash of an F-16C near Joint Base Andrews (JBA), Maryland, on April 5, 2017 (see *Attrition*, June, p84), was released on October 26. The aircraft came down southwest of the base at 0913hrs local time. The mishap pilot safely ejected and did not sustain any injuries. The report identifies the aircraft as 87-0306 'DC', assigned to the Maryland Air National Guard's 113th Wing, 121st Fighter Squadron 'Capital Guardians'. The crash occurred when the aircraft, one of a four-ship, was departing JBA for a basic surface attack training mission at Fort Indiantown Gap. The mission was planned to include simulated basic unguided bomb attacks followed by low-angle strafe attacks with training ammunition in the aircraft gun. The mishap aircraft was the number two aircraft in

the formation. The formation taxied to the arming area and then continued to runway 01 Left uneventfully, with no abnormal indications observed.

The first aircraft took off at approximately 0912hrs and began to follow the standard instrument departure procedures for the Camp Springs 1 departure out of JBA. The pilot of the incident aircraft followed, selecting maximum reheat and beginning the take-off roll – getting airborne at 0913hrs. Approximately four seconds after weight-off wheels, the engine monitoring system computer recorded faults, which indicated that the powerplant had transitioned to a hybrid mode of operation, experienced a pyrometer over-temperature and a fan-shaft overspeed. The F110-GE-100C's hybrid mode of operation is activated when the digital electronic control detects certain failures. In this mode,

the main engine control (MEC) provides fuel flow scheduling and metering, plus variable stator vane control. The faults caused a master caution light to display, following which the pilot moved the throttle from afterburner to military power while approaching 300kts calibrated airspeed, and continued with the departure with no perceived indication of engine abnormalities.

After turning left onto a heading of 270 degrees (west), the pilot felt an un-commanded acceleration, inconsistent with the throttle setting at that time, with the airspeed increasing to 420kts. This was followed by a loss of thrust, at which point the pilot radioed to the flight leader that his engine was "giving out". This resulted in an engine core overspeed, over temperature, fire and subsequent failure. The pilot was around 8-9 miles (13-14km)

from JBA at 6,520ft (1,987m) above mean sea level at this point. This meant the distance to the nearest suitable recovery airfield was beyond the aircraft's glide capabilities, negating any chance of safe recovery. The pilot then successfully executed a controlled ejection after manoeuvring the disabled aircraft over a non-residential area.

First responders from JBA arrived at the pilot's location at 0926hrs. The pilot was evacuated by the 1st Helicopter Squadron, which was coincidentally conducting a local training mission with a flight surgeon on board.

The jet's two external fuel tanks were jettisoned prior to pilot ejection and they impacted on private property east of the Potomac River shoreline south of National Harbor, Maryland. The aircraft itself impacted a wooded area 3.4nm southwest of JBA. The F-16, valued at \$22,198,075, was destroyed.

There were no personnel injured on the ground. The environmental clean-up operation of the impact site cost \$856,777.

The AIB President found by a preponderance of evidence the cause of this accident was the incorrect assembly of the MEC differential pressure pilot valve, which was missing a required 600-degree retaining ring and the anti-rotation pin. The misassembled valve caused the MEC to malfunction and to incorrectly meter abnormally high fuel flow. The uncontrolled operation caused severe engine overspeed, over-temperature and fire. A substantial contributing factor was identified as the 552nd Commodities Maintenance Squadron, MEC Overhaul Shop, Oklahoma City Air Logistics Complex, for a lack of adequate procedural requirement for MEC parts accountability.

Accident Reports

D: Oct 3
N: Afghan Air Force
T: Cessna 208B Grand Caravan
S: YA-12303

After dropping off the new provincial governor, Mahmoud Baligh, at Nili Airport, in Daykundi Province, the aircraft experienced a technical problem shortly after take-off and returned for an emergency landing. However, it veered off the runway onto rough ground, causing the nosewheel to collapse, and damaging the propeller. No injuries were reported.

D: Oct 4
N: Peruvian Navy
T: An-32B
S: AT-530

During a logistics flight for the VRAEM Special Command, the aircraft landed at Mazamari-Manuel Prado Ugarteche Airport, in the Junin region of Peru, but overran the runway. It then crossed a road and crashed into the 48° Comandancia Policial de Mazamari (Mazamari Police Command) building. The nose section was severely damaged, as was the number two propeller. The aircraft was carrying 70 policemen and an unidentified number of crew, but no injuries were reported.

D: Oct 6
N: Indian Air Force
T: Mi-17V-5

After getting airborne from a helipad north of Tawang, Arunachal Pradesh, about 3.7 miles (6km) from the India-Tibet border, on its second routine air maintenance sortie of the day, this helicopter crashed at around 0659hrs. All seven military personnel on board were killed, including five from the air force plus two from the army. The Mi-17 was carrying supplies to an Indian Army forward post in hilly terrain and crashed close to the drop zone, catching fire immediately. Unconfirmed local reports suggest it was parachuting kerosene in jerrycans on pallets when one parachute struck the tail rotor, causing loss of control.

D: Oct 6
N: Mexican Air Force
T: Bell 412EP



Above: Peruvian Navy An-32B AT-530 embedded in a building at Mazamari-Manuel Prado Ugarteche Airport after it overran the runway on October 4. via Juan Carlos Cicales

S: 1211
 While undertaking a training flight, this helicopter crashed about 2.5 miles (4km) northeast of the town of El Salto Pueblo Nuevo, near the Santa Isabel tourist ranch in the mountainous state of Durango. Seven of the eight on board were killed and a seriously injured survivor was evacuated by air to hospital. On board were two pilots, one officer and five troops from the 85th Infantry Battalion of the 10th Military Zone. The helicopter was thought to be operated by Escuadrón Aéreo 101, based at Santa Lucía.

D: Oct 6
N: Russian Aerospace Forces
T: Mi-28N

While flying over Syria escorting a Mi-8 that was carrying personnel from the Russian Centre for Reconciliation of Conflicting Parties, this helicopter experienced a technical problem and was forced to make an emergency landing in Hama Province. The two crew members were unhurt and picked up by rescue personnel before being

transported back to their base. So-called Islamic State claimed to have shot down the Mi-28, but Russian Defence Ministry officials said that examination showed no sign that it had been fired upon.

D: Oct 7
N: UAE Air Force and Air Defence
T: Unidentified fighter

This aircraft crashed following a technical malfunction during a mission in Yemen, killing both crew members.

D: Oct 10
N: Egyptian Air Force
T: F-16 Fighting Falcon

This aircraft is reported to have crashed near the Libyan border, killing the pilot. It was carrying out air strikes against smugglers at the time.

D: Oct 10
N: Russian Aerospace Forces
T: Su-24M2

While attempting to take off from Latakia-Hmeymim air base, Syria, for a combat mission, the aircraft failed to become airborne due to a suspected technical malfunction,



Above: Officials inspect Pakistan Army Aviation Corps/3 Army Aviation Squadron Mushshak 79-5087 following its crash-landing on October 13. via Waseem Abbas

skidded off the runway and caught fire. Neither crew member had time to eject and were killed.

D: Oct 11
N/U: US Marine Corps/HMH-462
T: CH-53E Super Stallion
S: 163078 'YN-21'

During a routine training mission from Futenma Air Base, Japan, one of the helicopter's engines caught fire while flying over the sea and smoke began to enter the cockpit and main cabin. The crew performed an emergency landing at 1714hrs in an open field near Higashi village, just outside the Northern Training Area on Okinawa and evacuated safely. The fire took hold and despite a quick response by local firefighters the blaze had consumed the aircraft by the time the flames were extinguished.

D: Oct 12
N/U: Spanish Air Force/Ala 14
T: EF2000 Typhoon
S: C.16-69/10092

After performing a flypast as part of a formation display at the Spanish National Festival in Madrid, the aircraft broke formation while on approach to land at Albacete-Los Llanos air base and, for reasons unknown, rolled inverted and plunged into the ground. The pilot, Capt Borja Aybar, had no time to eject and was killed.

D: Oct 13
N/U: Pakistan Army Aviation Corps/3 Army Aviation Squadron
T: Mushshak
S: 79-5087

During a flight from Wana to Kohat, the aircraft crash-landed at Wana town in Waziristan following a technical problem with the engine, resulting in the undercarriage collapsing and causing extensive damage to the airframe. The three occupants (pilot and two passengers) sustained some injuries.

D: Oct 16
N/U: Japan Air Self-Defense Force/Hamamatsu Kyunantai
T: UH-60J Seahawk
S: 58-4596

This helicopter took off from Hamamatsu at 1751hrs local time for a routine night search

Abbreviations: D: Date N/U: Nationality/Units T: Type S: Serials

and rescue training mission. The last radio contact from the crew was at 1757hrs, and at 1802hrs radar contact was lost. Debris, including boots and helmets, was later found in the Pacific about 30km (18 miles) off the coast near Hamamatsu – all four crew members were assumed to have perished.

D: Oct 17
N/U: Spanish Air Force/Ala 12
T: EF-18M Hornet
S: C.15-52 '12-10'

During take-off from Torrejón air base, it is believed the aircraft suffered an engine failure and attempted to abort, but control was lost and it ran off the end of the runway. The aircraft was destroyed and the pilot, Lt Fernando Pérez Serrano, was killed.

D: Oct 17
N: UAE Air Force and Air Defence
T: AH-64D Apache

Both crew members were killed when this helicopter crashed in al-Jawf province, Yemen, following technical failure during an Operation Restoring Hope mission against the Houthi militia.

D: Oct 18
N: Colombian Army
T: UH-1H-II Huey II
S: EJC-5412

This helicopter was extensively damaged when it crashed at Copacabana, Antioquia, while en route from Bello municipality, Antioquia, to the military base at Tolemaida. All ten on board were injured.

D: Oct 18
N/U: Japan Air Self-Defense Force/7 Kokudan/302 Hikotai
T: F-4EJ Kai Phantom II
S: 87-8408

While taxiing to runway 03R at Hyakuri Air Base at around 1145hrs, the pilot reported the port main undercarriage had been damaged, resulting in the underwing external fuel tank contacting the taxiway. The resulting sparks started a fire. The crew exited safely but it took 30 minutes to extinguish the blaze, which extensively damaged the aircraft.

D: Oct 19



Above: Japan Air Self-Defense Force/7 Kokudan/302 Hikotai F-4EJ Kai 87-8408 following the incident during which it caught fire at Hyakuri on October 18. *Micha Lievers*

N/U: Argentine Air Force/EAM/ Grupo Aéreo Escuela
T: Grob G 120TP-A
S: E-509

The two crew of this aircraft bailed out safely with only minor injuries before it crashed near Alta Gracia, in Lozada, Córdoba province, about 20km (12 miles) south of its home base at Córdoba. The aircraft had failed to recover from a spin during a routine training flight.

D: Oct 20
N/U: Royal Australian Navy/ 725 Squadron
T: MH-60R Seahawk
S: N48-020 '920'

While in the hangar aboard Anzac-class frigate HMAS Warramunga (FFH 152) en route from Perth to the Gulf, the helicopter was extensively damaged, with one source suggesting it could even be a write-off. Reports indicate that the MH-60R appears to have

broken free of its tie-downs and was damaged in heavy seas while the ship was crossing the Great Australian Bight.

D: Oct 25
N/U: Chinese PLAAF/4th Regiment
T: JL-9

Both the instructor and student pilot ejected safely from this aircraft after a bird strike during a training flight in northern China. The aircraft was assigned to the 4th Regiment as part of the Aviation University Flight Instructor Training Base at Bengbu, Anhui province.

D: Oct 27
N/U: US Army/4-160th SOAR
T: MH-47G Chinook?

NATO Operation Resolute Support officials have confirmed a helicopter incident in Logar province, Afghanistan. Lt Col Koné Faulkner, Resolute Support Spokesman, said the following morning: "We can confirm the

helicopter crash in Logar province late Friday evening was not the result of enemy action. We have full accountability of all personnel and the crash site is secured." One US service member died the following day as a result of injuries sustained in the crash, while six others were injured and treated at a local medical facility. On October 29, the US Department of Defense announced the fatality was Chief Warrant Officer Jacob M Sims from the 4th Battalion, 160th Special Operations Aviation Regiment (SOAR) at Joint Base Lewis-McChord (JBLM), Washington. As the 4-160th SOAR, based at Gray Army Air Field, JBLM, operates the MH-47G Chinook, it would suggest this was the type involved in the crash.

Additional material from: Waseem Abbas, Rick Burgess, Horatio J Clariá, Juan Carlos Cicales, Scramble/Dutch Aviation Society and René J Uijthoven. **AFM**

Marine Corps Osprey identified

Below: US Marine Corps MV-22B Osprey 168281 'YW-03' from VMM-364 'Purple Foxes' has been confirmed as the example lost in an accident in Syria on September 28 (not 29) – see *Attrition*, November, p74. The aircraft is seen here on an unknown date at an undisclosed location in the US Central Command area of operations when it was assigned to VMM-363 and wearing the 'VMM-AMERICA' titles adopted for squadrons when deployed in the region.



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Always and everywhere

Under current plans, time looks to be running out for the Royal Netherlands Air Force's unique Gulfstream IV, as **Stephan de Bruijn** reports.



The sole Koninklijke Luchtmacht (Royal Netherlands Air Force, RNLAF) Gulfstream IV is stationed at Eindhoven Air Base and belongs to 334 Squadron. The unit's motto is 'Semper et Ubique' – roughly translated as 'Always and everywhere'.

The Gulfstream IV (the original manufacturer's designation, G-1159, is rarely used) is unusually luxurious. It is used to transport Dutch dignitaries, including members of the government, high-ranking defence officials and members of the Royal Family. After being on the Hong Kong civil register, the GIV was purchased second-hand in December 1995 and entered RNLAF service as serial V-11 (c/n 1009) on April 1, 1996. The aircraft has narrowly escaped several cutbacks in the years since, but due to its essential task, it has soldiered on working for the ministry of defence.

Planned retirement

Although the aircraft is still in excellent condition and looks immaculate, it is now

nearing the end of its operational life. Current plans call for the RNLAF to retire it, but in theory, V-11 will continue to fly until December 31 next year. According to a spokeswoman from the ministry of defence: "The need for fast and flexible

transport to the area of operations will continue after that date." She continued: "At this moment the ministry of defence is researching how to fulfil this requirement – within the existing financial framework. This could involve continuing operations with



Above: The Dutch government makes frequent use of the sole RNLAF Gulfstream GIV and it can often be observed in foreign countries. The skyline of The Hague, the seat of the Dutch government, can be seen in the background.



Left: A spectacular view of Gulfstream V-11 over the Dutch coastline. **Right:** The RNLAf GIV during a low-level flight over the North Sea. Purchased in 1996, the aircraft has a range of 4,800 miles and can reach an altitude of 46,000ft. **Below right:** Both airbrakes and jet deflectors can be seen clearly as the RNLAf Gulfstream touches down at its home base of Eindhoven. All photos Stephan de Bruijn



August 14 and will also use it in a VIP role.

A Boeing 737 Business Jet, with the registration PH-GOV, will replace PH-KBX. The new 24-seat airliner cost \$89m and can fly non-stop to the Dutch Antilles. It is expected to roll off the production line next May, and will be delivered in March 2019, after receiving its VIP interior.

The Boeing purchase meant that the proposal for joint replacement of the F70 and GIV was scrapped. The ministry of defence spokeswoman continued: "A new, realistic option is to replace the GIV within the framework of an international co-operation agreement such as the successful European Air Transport Command (EATC)." The EATC, with its headquarters at Eindhoven Air Base, provides participating nations (currently Belgium, Germany, France, Luxembourg, Italy and Spain) with effective and efficient air transport, air-to-air refuelling and aeromedical evacuation capabilities. It remains possible that the EATC could introduce a shared VIP transport fleet, finally sealing the fate of Gulfstream V-11. **AFM**

V-11, or [...] finding a suitable successor."

In late 2015 and early 2016 consideration was given to replacing the GIV in parallel with the unique orange, blue and white coloured Fokker 70 that had been operated by the Dutch government (PH-KBX, c/n 11547) since March 1996. Initial plans envisaged the purchase of two Gulfstream 550s to replace the Fokker and the GIV.

The Fokker 70 was maintained and flown by employees of KLM, the Dutch national carrier, on behalf of the government and Royal Family. KLM, a long-term operator of the Fokker 70 across its European destinations, notified the Dutch government that it would stop operating the type this year. PH-KBX was sold to an Australian company, Alliance Airlines. On June 3 Dutch press and aviation enthusiasts were invited to say goodbye to the 'Orange Bird' and the aircraft departed Woensdrecht Air Base on August 3 on a ferry flight to its new owners. It arrived in Brisbane on August 6 to join Alliance, the world's largest Fokker operator. The airline registered the aircraft as VH-KBX on

A Chinook helicopter is shown in flight against a blue sky with some clouds. In the foreground, a soldier in full combat gear, including a helmet, goggles, and a rifle, stands in a grassy field. The soldier is wearing a camouflage uniform and has a tactical vest. The helicopter is a dark color and has its rotors spinning. The overall scene is outdoors in a natural setting.

NEXT ISSUE

COMING UP IN **AFM**

'Durabo' – 'I will survive' – is the motto of the Italian Army's 3° Reggimento Elicotteri per Operazioni Speciali (REOS, Special Operations Helicopter Regiment) based at Viterbo, near Rome. *AFM* goes behind the scenes with the newest unit within the Aviazione dell'Esercito (AVES, Italian Army Aviation) to see it at work with its latest ICH-47F Chinooks, an aircraft used for challenging missions including insertion of special forces and maritime special operations.

Photo: Dino Marcellino

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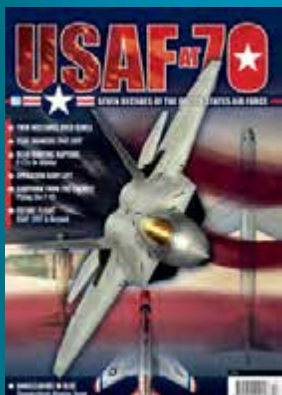
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